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MOTOR AGE

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Number 4

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CHICAGO, JANUARY 24, 1924

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Three Dollars a Year

A well known salesman selling a famous car in the $2500 class said the other day:—"Find me a man who drives a Jordan for a year, sell him some other make of car, and I will eat your hat."

Jordan dealers tell me there is a good deal in what he says.

Edward S. Jordan

President
Jordan Motor Car Company
Cleveland, Ohio

Entered as second-class matter Sept. 19, 1899, at the post office at Chicago, Ill., under Act of March 3, 1879.

Two Kinds of Stability

Think of the Stability of Manufacturing Methods as Well as the Stability of the Car Manufacturer

Every dealer should consider well the stability of the motor car company he represents.

He should consider it not only from the angle of continued existence. That, of course, is vital,—but a company *may* continue to exist for several years without any real stability of manufacturing or of the reputation which depends upon sound methods in the shop.

The ideal connection for a motor car dealer, from the viewpoint of stability, is a company that has been in business for many years, and which has during those years enjoyed a continually increasing reputation for making a good motor car.

You may be absolutely sure that no company can enjoy such a repute unless its methods of manufacturing are stabilized, honest and efficient.

In making such a connection, the dealer does not need to fear that the company's present car will be succeeded, next year, by an inferior successor,—nor does he need fear that radical changes, which embarrass and disturb, will be forced upon himself and the public.

Investigate the Management

The management of any motor car company is all-important.

The motor car dealer should beware of any connection where the management is not known to have the will, and the ability, to make an honest car and an honest value.

In some cases, as in the case of Hupmobile, there can be no doubt, because of the long history of success with which both management and motor car have met.

The first Hupmobile was made 15 years ago. It was just as good a car, in materials and in fine workmanship, as the most expensive cars then made,—but sold at a lower price only because it was smaller.

The Hupmobiles being built today, are produced on the same principle, —but the value of the Hupmobile is actually greater today, because of the larger quantities produced.

You will find representatives of that 15-year old Hupmobile production, in every community, and in every part of the globe, still in daily service.

The present Hupmobile,—and every Hupmobile since the first car produced 15 years ago,—is built as honestly and as conscientiously for hard, long service, as it is possible to build it.

Hupmobile's Future Is Sure

The motor car dealer does not have to speculate upon the future of Hupmobile. He can be sure, from its past history, and from its present stability, that it will continue upon the even tenor of its way,—making money for the men who handle it,—assuring them maximum prosperity year in and year out.

Hupmobile will continue to manufacture as good a car as can be made. It will continue to deal fairly and squarely with those who are associated with it through dealer franchise. It will continue to enjoy the high regard of the automotive industry and of the public.

Hupp Motor Car Corporation
Detroit, Michigan

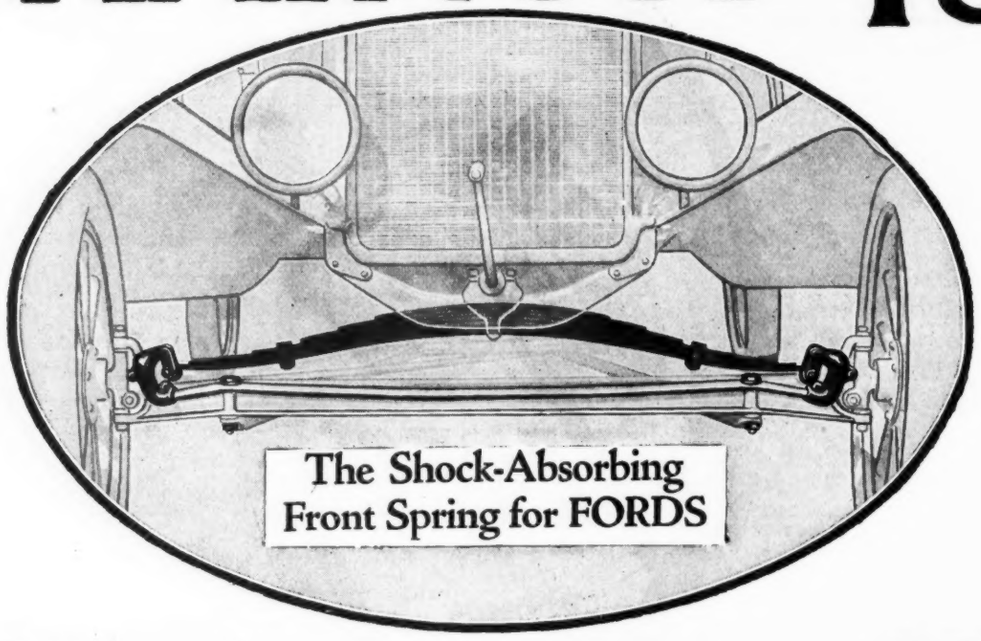
QUALITY
Piston Rings

For over twelve years we have made nothing but high grade Piston Rings to the very rigid specifications of the greatest designers of engines known.

Over 121,000,000 rings have been shipped to satisfied customers during that period. With this remarkable showing of experience and production we give you *All the Good* that can be put into *Any* piston ring in *Every* QUALITY *Ring* at the common-sense list price of 25 cents each.

The Piston Ring Company
Muskegon, Michigan

TRAINOR "45"



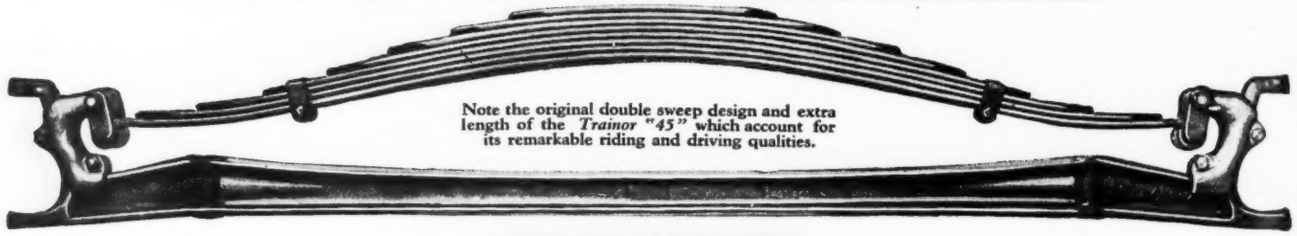
No Wonder It's a Money-Maker

THE extra length of the *Trainor "45"*—12 inches longer than the regular Ford front spring—and its original double sweep design give a shock-absorbing action that steadies the car and makes Ford driving easier and safer than any other equipment we know. That's why a Ford equipped with the *Trainor "45"* rides so smoothly and steers so easily on rough or rutty roads—and through gravel, sand or mud—just like a bigger, heavier car.

No wonder you don't have to wait for springs to break to sell the *Trainor "45"*. No wonder every Ford owner is a prospect. No wonder the *Trainor "45"* offers an unlimited money making opportunity for dealers. Write for prices and further details.

The *Trainor "45"* is made of high-grade alloy spring steel—Trainor treated—bronze bushed. And like all Trainor springs it is backed by the unqualified Trainor guarantee of satisfaction. Jobbers should write at once for our distributing proposition.

TRAINOR NATIONAL SPRING COMPANY, New Castle, Indiana



Note the original double sweep design and extra length of the *Trainor "45"* which account for its remarkable riding and driving qualities.

TRAINOR SPRINGS

"The Trainor Way", an improved method of handling replacement springs, is making more money for jobbers everywhere. Write for it.

MOTOR AGE

Reg. U. S. Pat. Off.

Published Every Thursday by

THE CLASS JOURNAL COMPANY

5 So. Wabash Ave.
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A Personal 1924 Proposition for the Dealer

THE Goodrich 1924 contract is tailor-made for the dealer. If he wrote it himself, he could not better fit his needs. It is shaped to give him a prosperous 1924.

The basic Goodrich policy is a universal price to contract dealers. You know that your prices are the best Goodrich quotes anybody; and no other dealer anywhere can purchase Goodrich Tires for less. This policy is backed by liberal dating during the winter, and complete price protection.

Silvertown, the oldest, best known tire in the world, at record low prices — Commander Cord, challenger of all low price competition — and Goodrich "55", a quality fabric priced to defy rivals—give a line that enables a dealer to balk competition in every class of trade.

Don't sign any contract until you know it personally. Write the nearest Goodrich Branch for complete details.

THE B. F. GOODRICH RUBBER COMPANY
ESTABLISHED 1870

Goodrich
TIRES *"Best in the Long Run"*

The SHORT CUT to time, labor and profits

CUT hours from the time ordinarily required to make bearing adjustments: cut labor and trouble in half. There's a shim for EVERY car and real profits in every shim. Your jobber sells Laminum. Complete line. A shim for every make of car.

Our representatives will be glad to see you at the Blackstone Hotel during the Chicago Show

Send for a sample and see how easy LAMINUM PEELS!

Address "Sales Department"

LAMINATED SHIM CO., Inc.
14th St. & Governor Pl.
Long Island City, N. Y.

St. Louis: Mazura Mfg. Co.

LAMINUM

STUDEBAKER

An Advantage to the Buyer—A Necessity to the Seller

The fact that Studebaker builds a complete line of cars is a decided advantage to every Studebaker buyer—just as it is to every Studebaker dealer.

Here's why—

A customer, we'll say, buys a Light-Six. He likes it—everyone likes his Studebaker. He gets to know the men in the Studebaker organization and likes them. Calls 'em by their first names—feels safe in leaving matters to their judgement.

Sooner or later the customer wants a larger car—most every owner of a smaller car decides some day to own a bigger one. The Studebaker buyer doesn't have to go somewhere else to get it and get acquainted all over again. He selects a Special-Six, or a Big-Six, and deals with the same good friends.

With a complete line of Sixes, the Studebaker dealer is able to make these customers permanent Studebaker customers—these customers bring in other customers who become permanent, and so on—sort of an endless chain.

When it comes to building a profitable business, there's nothing to compare with a good line of merchandise in a variety of the right styles, sizes and prices, and a volume of owners who are enthusiastic over the product and continue to buy it time and time again.

THE STUDEBAKER CORPORATION OF AMERICA
South Bend, Indiana

1924 MODELS AND PRICES—*f. o. b. factory*

LIGHT-SIX *5-Pass., 112" W. B., 40 H. P.*		SPECIAL-SIX *5-Pass., 119" W. B., 50 H. P.*		BIG-SIX *7-Pass., 126" W. B., 60 H. P.*	
Touring	$995	Touring	$1350	Touring	$1750
Roadster (3-Pass.)	975	Roadster (2-Pass.)	1325	Speedster (5-Pass.)	1835
Coupe-Roadster (2-Pass.)	1195	Coupe (5-Pass.)	1895	Coupe (5-Pass.)	2495
Coupe (5-Pass.)	1395	Sedan	1985	Sedan	2685
Sedan	1485				

THIS IS A STUDEBAKER YEAR

The Day of the Taxicab Is Just Dawning!

Kuehne BODIES

They Get You the *Remaining* Profit

From sport roadster to limousine de luxe, the manufacturer has completed your line of owner or chauffeur-driven cars. All opportunities for sale but one are foreseen.

Now sell taxicabs too. There is a brisk and growing demand for them. They pay the only other profit to be had from car sales.

Get that profit. Kuehne taxicab bodies will do it. They are built for taxicab service alone, long life, rugged strength, good looks, great comfort for driver and passenger are inbuilt.

This business is rightfully yours. And it is not one-time business, either. Besides the regular service a taxicab requires, it is not uncommon for two or three chasses to be sold for one Kuehne body. Yes, they give that kind of satisfaction.

Send now for the complete story.

L. F. KUEHNE CO.
2609 Archer Ave.
CHICAGO
"Coach Makers Since 1888"

MARMON—Never in all the years of its goodness has the Marmon car made new friends so rapidly — — —

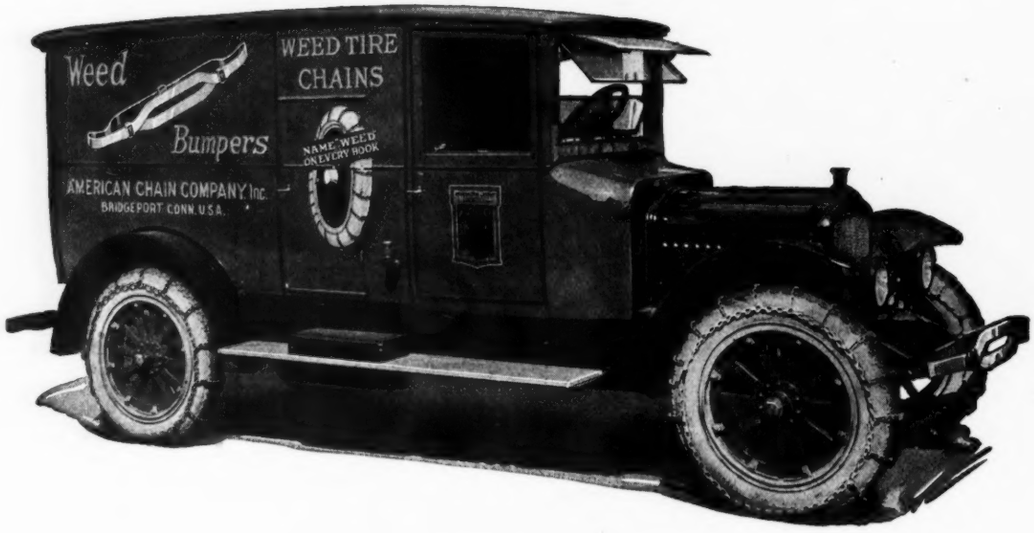
Automobile dealers the country over have been quick to appreciate that a $400 reduction in the Marmon price and the addition of sixteen distinct refinements has broadened the Marmon market by multiplying very materially the number of possible Marmon prospects.

Price Range, $2785 to $4285. All Prices f.o.b. Factory

NORDYKE & MARMON COMPANY · *Established 1851* · INDIANAPOLIS

MARMON

WEED



ADVERTISING *ON WHEELS*

THE FLEET OF *WEED SALES PROMOTION* CARS are manned with intelligent and well trained merchandisers who give *valuable sales and advertising helps* to dealers of *genuine* WEED Chains and Bumpers.

WEED Sales Promotion Cars are a part of the big WEED CAMPAIGN that rolls on and on without let-up. *Every* month of *every* year our BIG ADVERTISING CAMPAIGN continues to popularize the name WEED.

Dealers who stock and recommend *genuine* WEED Chains and Bumpers are *wise* merchants.

"Use 'Em Yourself to Sell 'Em"

ACCO

AMERICAN CHAIN COMPANY, INC.

BRIDGEPORT, CONNECTICUT

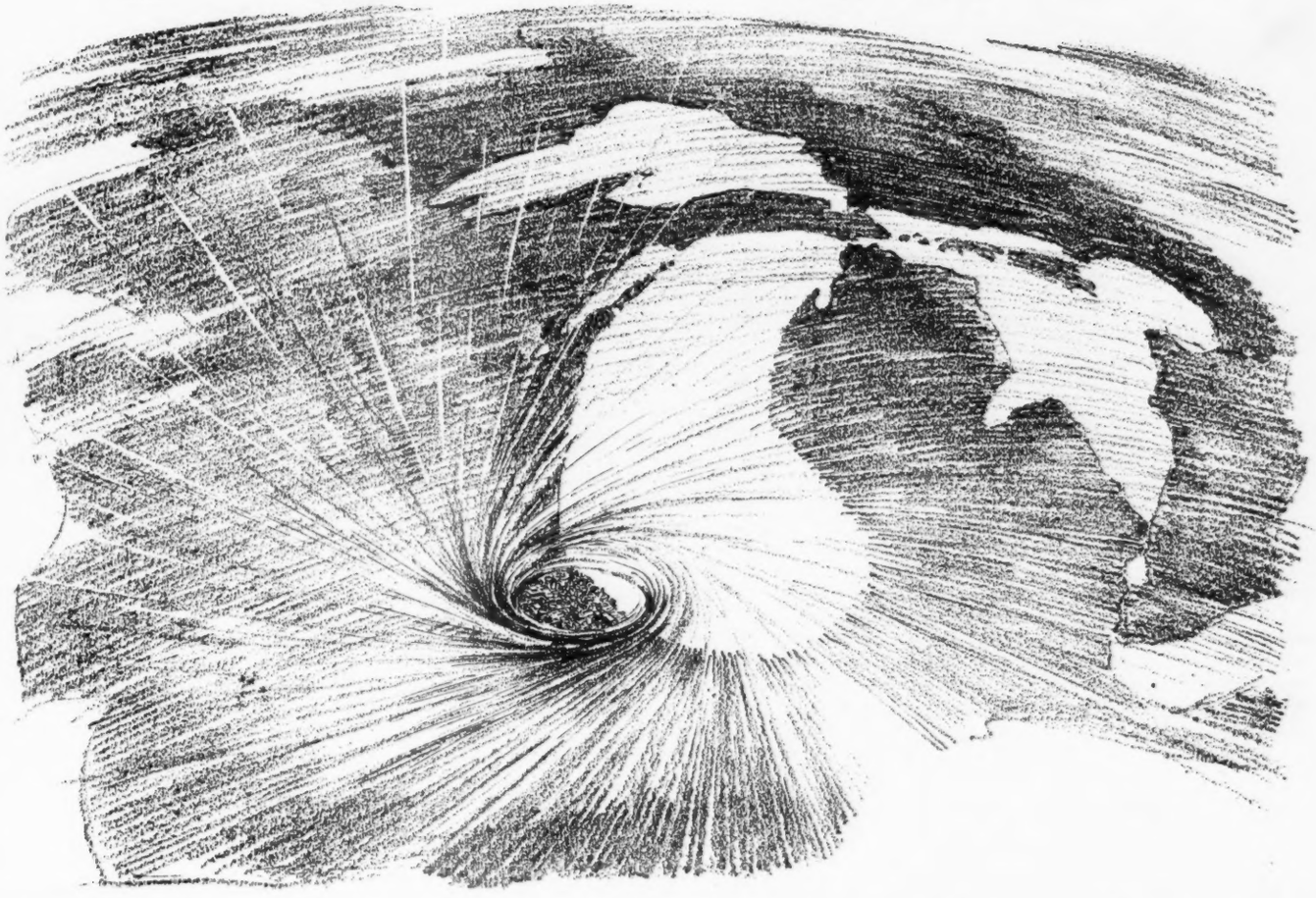
In Canada: DOMINION CHAIN COMPANY, LIMITED, Niagara Falls, Ontario

District Sales Offices: Boston Chicago New York Philadelphia Pittsburgh San Francisco

LARGEST MANUFACTURERS OF WELDED & WELDLESS CHAINS FOR ALL PURPOSES

Vol. XLV Chicago, January 24, 1924 No. 4

MOTOR AGE



1924's Newest Automobiles Ready for Chicago Bow

National Show Moves to Midcontinental Setting, Where Its Brilliance Will Attract New Multitudes

By SAM SHELTON

THE beauty, grace, refinement and power of the 1924 automobile will radiate the brilliance of the industry's achievement from the Chicago Coliseum and Armory throughout the forthcoming week.

With unsurpassed popular acclaim heralding it, the great exhibition of the National Automobile Chamber of Commerce moves on from its brilliant run in the huge Bronx Armory to a new midcontinental setting, where more multitudes of owners, admirers, dealers and distributors may view the results of the marvelous progress made by the manufacturers during the past year.

The exhibition, which is the twenty-fourth annual national show for Chicago, will open on the afternoon of Saturday, Jan. 26, and close the evening of Saturday, Feb. 2. As usual, it will be managed by Sam A. Miles, veteran pilot of automobile shows since the beginning of such things.

Rivaling the grandeur of the car exhibitions will be the displays of nearly 200 accessory manufacturers, whose products, novel, ornamental, beautiful and use-

THE SHOW

Twenty-fourth Annual Chicago Show.

Place—Coliseum, 1513 South Wabash avenue, and Armory nearby. (From loop, Cottage Grove or Indiana cars on Wabash avenue direct to Coliseum.)

Management—National Automobile Chamber of Commerce.

General Manager, Sam A. Miles.

Superintendent, L. L. Fest.

Admission charge—75 cents.

Date—Jan. 26 to Feb. 2, inclusive.

Number of exhibitors—71 car and taxicab manufacturers and about 200 accessory manufacturers.

ful, are daily assuming greater importance in the industry because of their vast possibilities of sales to the 15,000,000 motorists of the country.

A slight decrease in the number of motor vehicle exhibitors as compared with last year is more than offset by the completeness of the lines scheduled to be shown this year. The number of makers exhibiting last year was 79. This year the number is 71, including seven taxicab manufacturers, some of whom also are well-known producers of passenger cars.

To the automotive merchants of the country, not only those engaged in selling cars, but also those handling associated products, this show together with attendant features of the week, will constitute a great industrial and educational bazaar where they may see the most advanced merchandise, learn about sales policies and opportunities, and become informed from the experiences of their fellows as to the successful steps taken by some of them toward the solution of disturbing merchandising problems.

N. A. D. A. Convention

High among educational opportunities offered by the show week will be the seventh annual convention of the National Automobile Dealers' Association, to be held at the La Salle Tuesday and Wednesday. All automobile dealers are welcomed to the sessions regardless of whether or not they are members of the association. The complete program which includes addresses by some of the foremost leaders of the industry, was published in last week's issue of MOTOR AGE. Taken from top to bottom it constitutes a valuable course in the merchandising of automobiles from which all dealers will be able to profit, no matter what make or makes of cars they are selling.

This convention will be a cross section of the most successful merchandisers of automobiles and automotive products, affording to those who attend a broad view of interesting selling possibilities. The convention will be presided over by G. G. G. Peckham of Cleveland, president of the association. The program will be opened by the report of General Manager C. A. Vane, and there will follow address by J. H. Collins of the Chilton Co.; C. E. Gambill, of the Gambill Motor Co., Chicago; John A. Nichols, Jr., sales manager of Dodge Brothers, and William B. Burrus, sales consultant, Kansas City.

The greater part of the second day will be devoted to a study of the merchandising of used cars. Three selling plans of rather wide use will be discussed. James E. Appleby of the Percy Chamberlain Associates, Inc., will explain the workings of the copyrighted plan which bears his name; R. H. Martin, president of the Martin-Nash Co., Atlanta, Ga., will discuss the Atlanta Statistical Bureau, and R. J. Schmunk, Hudson-Essex distributor at Cleveland, will tell about the working of the Cleveland dealers' Green Seal plan of certifying used cars.

A feature of the convention will be the annual banquet at 6 p. m., Tuesday, at the La Salle Hotel, at which the entertainment will be provided by the Chicago Automobile Trade Association. There will be an address on "Building a Sales Organization," by G. H. Abercrombie, sales manager of the Fuller Brush Co.

The program also includes a business session on the second day, at which officers will be elected and the by-laws revised.

Many of the manufacturers exhibiting at the show have arranged to give dinners or luncheons for their distributors and dealers. Entertainment will be a feature of most of these gatherings, but in addition probably all of them will give opportunity for some helpful talk by the manufacturers to the men who constitute the necessary channels of distribution.

"Old Timers" Banquet

Among other events of a busy show week will be the annual banquet of the Old Timers' Club Tuesday night at the Congress Hotel, the annual meeting of the Automotive Electric Service Association Wednesday and Thursday at the Congress and the annual banquet of the Midwest Rubber Manufacturers' Associa-

The members of the Show Committee of the N. A. C. C. Left to right:

Schedule of Events for National Automobile Show Week at Chicago, Jan. 26-Feb. 2

CHICAGO, Jan. 19.—Following are some of the important events scheduled for the week of the Chicago National Automobile Show:

Jan. 25

Cadillac Chicago branch, dinner at Blackstone Hotel, evening.

Jan. 26

National Automobile Show opens at Coliseum and Armory, to continue until Feb. 2.
Salon opens at Drake Hotel.
Auburn Motor Co. Factory luncheon, Blackstone, noon.

Jan. 28

Directors' Meeting, National Automobile Dealers' Association, La Salle Hotel, 10 a. m.
Remy Electric Co. dinner at Congress Hotel, evening.

Jan. 29.

Old Timers' Club Banquet, Congress Hotel, 6:30 p. m.
National Automobile Dealers' Association, seventh annual convention opens at La Salle Hotel, 10 a. m.
N. A. D. A. annual banquet, La Salle, 6:30 p. m.
Midwest Rubber Mfgs.' Association, annual banquet, Morrison Hotel, 6:30 p. m.
Midwest Rubber Mfgs.' Association luncheon, Morrison, 1 p. m.
Oakland Motor Co., dinner, Blackstone, 6:30 p. m.
Auburn luncheon, Blackstone, noon.

Jan. 30

N. A. D. A. convention, La Salle, 10 a. m.
Automotive Electric ServiceAssociation, annual meeting, Congress.
Paige-Detroit, dealers' dinner, Blackstone, 7 p. m.
Auburn luncheon, Blackstone, noon.
Oldsmobile dealers' dinner, La Salle, 6 p. m.
Hupp Motor Car Corp., banquet, Congress, 6:30 p. m.
Willys-Overland dealers' banquet, Congress, 6:30 p. m.

Jan. 31

Automotive Electric Service Association, Congress.
N. A. D. A. directors' meeting, La Salle, 10 a. m.
Stutz Motor Car Corp., luncheon, Congress, noon.
Illinois Automobile Club luncheon, Congress, noon.
Buick luncheon, Blackstone.
Durant distributors' dinner, Congress, 6:30 p. m.
Studebaker dealers' dinner, Blackstone, 7 p. m.

Feb. 2

Last day of automobile show and salon.

H. M. Jewett, F. C. Chandler, Charles D. Hastings and S. A. Miles

tion Tuesday night at the Morrison Hotel.

Running throughout the period of the automobile show the Chicago Automobile Salon will hold forth at the Drake Hotel where many of the latest creations in exclusive and costly chassis and coachwork may be seen. This exhibition will mark the end of the season of international displays of this type of high grade motor vehicle production. The exhibits will include the products of many of the best American and European producers of custom coachwork and fine chassis. and Coliseum annex.

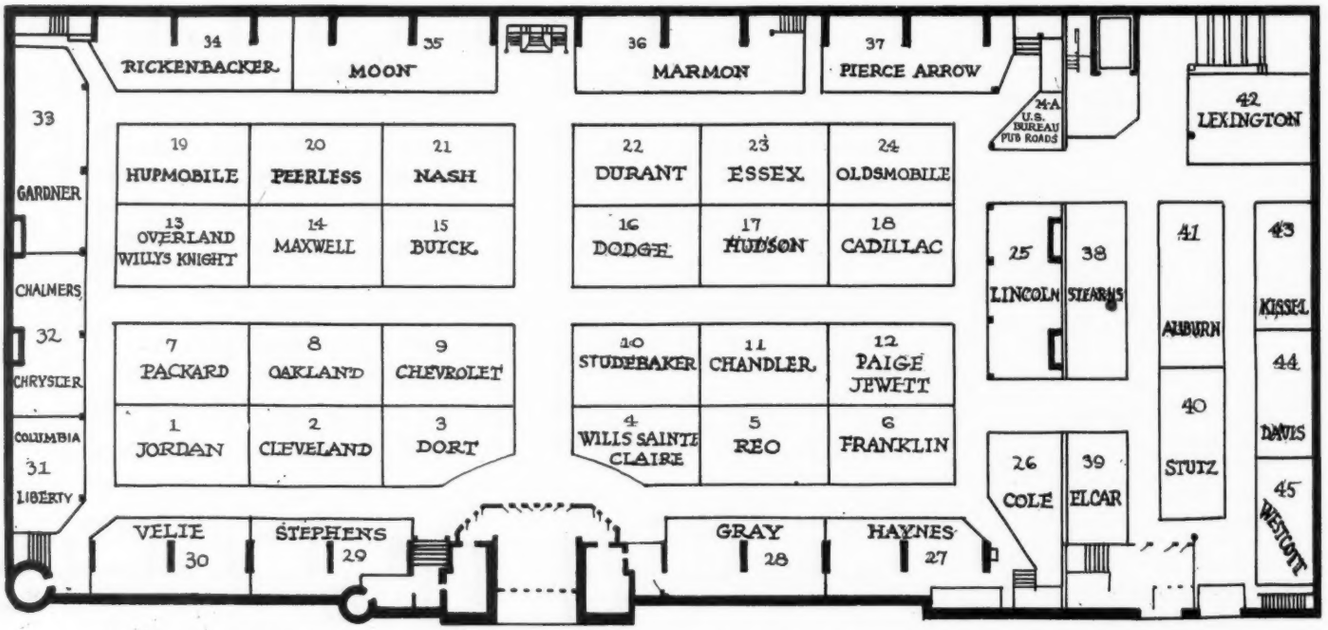
For appeal to the public and educational value to automotive merchants in general the National show, however, will undoubtedly prove to be the most important event of the week in Chicago. Carrying out a new decoration scheme this year the management will make of the Coliseum a beautiful spectacle reminiscent of the periods of Louis XIII and Louis XIV. Materials which artists have been fashioning for weeks in their studios will transform the huge show building into settings of unusual beauty.

More than 200,000 square feet of muslin and one ton of gold and colored bronze powders will be used in dressing up the great show structures. In addition to the posters, ceilings and drape effects, there will be on display 28 large lamp shades, each 5 feet 6 inches high and 8 feet 6 inches in diameter, painted on translucent fiber, creating an art glass effect.

Thirteen different and superb ceiling paintings, each measuring 165x25 feet and bearing a design patterned after those of the Renaissance period, will set off the whole display in the Coliseum

Like Conservatory Dome

The background is in bright Italian sky blue. This scheme will give visitors the impression that they are peering into a mammoth conservatory dome, only the application of the Renaissance formation



Floor plan of the Coliseum showing location of each car exhibit for the Twenty-fourth Annual Chicago Show

will lend more character, as the scrolls are interwoven.

Color tones of gold and other bronzes will bring out the acanthus leaf in its many twists and curves in greater detail. The treatment of the scroll at the north and south ends of the Coliseum will be similar to the ceiling effect, save that the part between the scrolls is to be cut away. This effect of illumination in the front and rear of the scroll painting.

In addition there will be a curtain placed seven feet back of the scroll curtain which, also, will be illuminated from the rear. At intersections between the painted ceiling, directly on the face of the large girders, are to be placed painted maskings mounted upon iron frames and these maskings will be illuminated from within, thus forming silhouettes of Rococo and Renaissance. This treatment lends itself immensely, as it overcomes the sea of scroll on the painted ceiling.

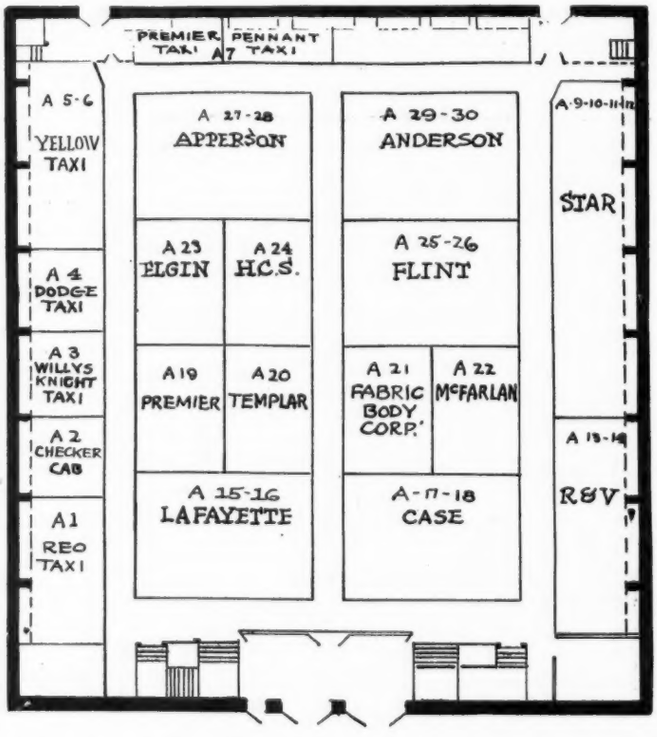
The balcony ceiling and extension will be treated in tones more delicate than those employed on the main ceiling of the Coliseum. Here the artists have arranged to decorate with light blues and ivories, the ornaments, decked with bronzes of pale gold and heliotrope, giving a pleasing contrast. Hundreds of circular lamp shades, treated in scrolls, will be suspended from the various ceilings.

Pylons to Divide Spaces

Four large pylons, each 35 feet high and 12 feet wide, with niches near the top, will be placed on the dividing lines of the exhibition spaces in the north and south sectors of the Coliseum. These niches will be backed with the red plush and raised bronze ornaments.

The exhibition spaces will be divided by groups of three columns, the large ornaments to be draped with red plush. Here the color scheme will be in vanguard tones of bronzes.

Architecture of the Louis XIII period will prevail in the Coliseum annex, where the main floor and ceiling will be treated in a manner similar to the Coliseum proper. The annex basement will be treated in light blues, pinks, white and gold.



Floor plan of the First Regiment Armory showing location of exhibits which can not be accommodated in the Coliseum

Harking back to the first of the Chicago automobile shows 24 years ago and comparing it with the magnificent spectacle to be staged next week, Manager Miles tells us that the participants in that first exhibition numbered 31 manufacturers of complete cars and 20 makers of parts and accessories.

He relates that in order to prove their contraptions actually would run the pioneers built a flat oval track, crossed at one point by a bridge for the use of the more timorous spectators. On this track demonstrations were given, as well as on a wooden hill built up almost to the roof of the building. It was a short hill and not too steep, but it served the purpose and helped clinch a majority of the few sales that were made at that show.

At the second show the next year there were 93 exhibitors, including a few European car manufacturers. About that time the National Association of Automobile Manufacturers was organized, taking the first step to direct and co-ordinate the progress of new industry, which was then showing signs of rapid development. When the fifth annual Chicago show was held there were 250 exhibitors in all. In 1905 the Association of Licensed Automobile Manufacturers succeeded the earlier association of manufacturers and a few years later it in turn gave way to the National Automobile Chamber of Commerce, the organization which today has charge of the national shows

and performs many other valuable services for the industry.

At this season when the automobiles of 1924 are making their formal bow to the public the editors of MOTOR AGE have surveyed the entire field of latest offerings of the manufacturers and singled out many notable features of progress. For the benefit of our readers these editors have undertaken in the pages which follow to review the most important of the developments making for the betterment of the automobile in regard to performance, power, appearance, comfort, reliability and ease of maintenance. The things they have written about in these pages may be seen at the show and there studied and compared.

DAN'S DIARY

JAN. 24.—Gosh. Everyday a fellow has got to learn something if he aint asleep in the head and wants to keep up with the percession and some days its hard as the dickens to tell what a guy has got to remember the day by except mabe a skimmed nuckel or a pounded thumb.

I bet ill remember last friday for a long time and i lurned a cupel of things two. I had a hury up job taking up the cunecting rod barengs on a old bus and not wanting to go to much bother i jacks the frunt wheals up a little so i could work easier seting the immergincy breaks to hold it stedy on the floor and putting some 8 in. blocks under the wheals to hold them up.

Everything was all right till i got to tuging on one of them nuts which is always set up tighter than the dickens. Well i give an offul pull on the socket rench with my foot aginst the block under the wheal but insted of the nut coming loose the darned car starts moving offen the blocks, backing up.

I gess i made the quickest moove in my life cuz here was this socket rench about a foot long pointing right down just a little above my chest. I wiggled side ways just as the bus dropped and rolled back aginst the side of the shop. The end of the rench wasent more than an inch from the floor and I can't help thinking what a swell hole i would of had in myself if i hadent of wiggled offul quick.

What it learned me was not to trust nobodys breaks till i tryed them and not to be in such a hury that i can't get ready for a job right.

Another thing it learned me is to cary employers liability inshurants on all my men when i get in bizness. I bet the boss aint got a sense worth of inshurants on me and Art and I would of had a swell chants of collecking 4 or 5 thousand bucks from him if i was to be crippled for life like the law in this state allows a guy.

At the Chicago Theatres During Show Week

Apollo: "The Lady in Ermine."
Adelphi: "The Best People," a comedy.
Blackstone: "The Changelings," a comedy.
Central: Jack Norworth in "Honeymoon House," musical.
Colonial: Zeigfeld Follies.
Cohan's Grand: "We Moderns" with O. P. Heggie and Helen Hayes, a comedy.
Cort: Leo Ditrichstein in "The Business Widow." A Ditrichstein comedy.
Chicago: The moving picture, "West of the Water Tower," with Glenn Hunter and May McAvoy.
Great Northern: John Martin Harvey in Shakespeare's Greek plays.
Garrick: The Bat Theatre of Moscow in Russian plays.
Harris: Taylor Holmes in his latest farce comedy, "The Nervous Wreck."
Illinois: Florence Reed in "The Lullaby."
La Salle: "Give and Take," with Louis Mann and George Sidney.
Majestic: Continuous vaudeville.
Princess: Tom Wise in "The Old Soak."
Powers: Lenore Ulric in "Kiki."
Playhouse: Joseph Schildkraut (in person) in "The Highwayman."
Palace: Vaudeville, matinee and evening performances every day.
Roosevelt: Blanche Sweet in the moving picture, "The Palace of the King."
Riviera: (North Side), Norma Talmadge and Joseph Schildkraut in the moving picture, "The Song of Love."
Rialto: Continuous vaudeville.
Selwyn: Duncan Sisters in "Topsy and Eva."
Studebaker: "Abie's Irish Rose."
State-Lake: Continuous vaudeville.
Tivoli: (South Side), same as at Riviera.

23 Years Ago This Week In Motor Age

(From MOTOR AGE of Jan. 23, 1901)

Chicago Show Is Assured

Chicago's "I Will" is once more proudly triumphant. The executive committee of the National Association of Automobile Manufacturers has recognized the claims put forward on behalf of the Chicago exhibition. It has rescinded the antagonistic resolution reported two weeks ago and has substituted therefor one which assures the success of the enterprise and the attendance of a majority of the leaders in its membership.

About a month ago the committee adopted a resolution advising members not to participate in any show which had not received the sanction of the association. The Chicago management, thereupon, made formal application for a sanction, and in support of its request furnished many good reasons why such sanction should be granted. The show will be held March 23 to 30.

Early Appreciation of Truck Value

That the problem of heavy hauling by self-propelled vehicles is securing a substantial foothold in the industry is not only demonstrated by the formation in America of such concerns as the Thornycroft Steam Wagon Co., which exists with the especial purpose of making and exploiting heavy steam wagons, but also by the fact that several manufacturers who have heretofore given their entire time and attention to light carriages are now experimenting with vehicles of the heavy class.

An Early Climber

At the Madison Square cycle and automobile show last week the Loomis Automobile Co. gave a demonstration of the hill climbing qualities of its gasoline vehicles. A Loomis carriage was made to climb the runway from the basement to the first floor, which is estimated to be a 40 per cent grade. Over this grade were placed 2 by 4-inch cleats to prevent slipping when walking up and down. The Loomis company states that the carriage was stopped and started at any point on this difficult surface, although the vibration in going over the cleats was enormous.

Exhibitors Whose Products

Passenger Cars

CARS

Anderson Motor Co., Rock Hill, S. C.
Apperson Bros. Auto Co., Kokomo, Indiana
Auburn Auto Co., Auburn, Indiana
Roamer Motor Car Co. (Barley), Kalamazoo, Michigan
Buick Motor Co., Flint, Michigan
Cadillac Motor Car Co., Detroit, Michigan
J. I. Case T. M. Co., Racine, Wisconsin
Chalmers Motor Car Co., Detroit, Michigan
Chandler Motor Car Co., Cleveland, Ohio
Chevrolet Motor Co., Detroit, Michigan
Cleveland Auto Co., Cleveland, Ohio
Cole Motor Car Co., Indianapolis, Indiana
Peerless Motor Car Co., Cleveland, Ohio
Columbia Motors Co., Detroit, Michigan
Geo. W. Davis M. C. Co., Richmond, Indiana
Dodge Brothers, Detroit, Michigan
Dort Motor Car Co., Flint, Michigan
Durant Motors, Inc., L. I. City, N. Y.
Elcar Motor Co., Elkhart, Indiana
Essex Motors, Detroit, Michigan
Locomobile Co. of America (Flint), 22 W. 61st St., New York City
H. H. Franklin Mfg. Co., Syracuse, N. Y.
Gardner Motor Co., Inc., St. Louis, Mo.
Gray Motor Corp., Detroit, Michigan
H. C. S. Motor Car Co., Indianapolis, Indiana
Haynes Auto Co., Kokomo, Indiana
Hudson Motor Car Co., Detroit, Michigan
Hupp Motor Car Corp., Detroit, Michigan
Paige-Detroit M. C. Co. (Jewett), Detroit, Michigan
Jordan Motor Car Co., Inc., Cleveland, Ohio
Kissel Motor Car Co., Hartford, Wisconsin
La Fayette Motors Corp., Milwaukee, Wisconsin
Lexington Motor Co., Connersville, Indiana
Columbia Motors Co. (Liberty), Detroit, Michigan
Lincoln Motor Co., Detroit, Michigan
McFarlan Motor Corp., Connersville, Indiana

List of Accessory

A. C. Spark Plug Co., Flint, Michigan
All Clear Windshield, Inc., Fall River, Mass.
Aluminum Co. of America, 2400 Oliver St., Pittsburgh, Pa.
American Automobile Digest, 15 W. 6th St., Cincinnati, Ohio
American Chain Co., Inc., Bridgeport, Conn.
American Federal Wheel Co., 50 Keefe Ave., Milwaukee, Wisconsin
Appleton Electric Co., 265 Canal St., New York City
Arrow Grip Mfg. Co., Glens Falls, N. Y.
Asch & Co., Inc., 17 W. 60th St., New York City
Auto Hone Co., Inc., 1587 Main St., Buffalo, New York
Auto Specialties Mfg. Co., St. Joseph, Michigan
Alfon E. Bahr & Co., 644 N. Michigan Ave., Chicago
Bassick Mfg. Co., 2650 N. Crawford Ave., Chicago
Becker Bros., Inc., 23 N. Jefferson St., Chicago
Beneke & Kropf Mfg. Co., 21st and Rockwell Sts., Chicago
Berg Auto Trunk & Spec. Co., Thompson Ave. and Hanly, L. I. City, N. Y.
Biflex Corp., Waukegan, Ill.
Borg & Beck Co., 914 S. Michigan Ave., Chicago
Robert Bosch Magneto Co., Inc., 123 W. 64th St., New York City
Boyle Valve Co., 2101 Larrabee St., Chicago
Britton Auto Prod. Co., Inc., 117 W. 63rd St., New York City
Bridgeport Chain Co., 964 Crescent Ave., Bridgeport, Conn.
Brown Lipe Gear Co., 1117 W. Fayette St., Syracuse, N. Y.
T. M. Brude Co., 326 W. Madison St., Chicago
Buda Co., Harvey, Ill.
Buffalo Specialty Co., 375 Ellicott St., Buffalo, New York
Bunting Brass & Bronze Co., Toledo, O.
Byrne, Kingston Co., Kokomo, Indiana
C. G. Spring Co., 2642 E. Gr. Bldg., Detroit.
Carr Fastener Co., 31 Ames St., Cambridge, Mass.
George R. Carter Co., 1600 Kentucky Ave., Connersville, Indiana
Champion Pneumatic Machine Co., 8164 S. Chicago Ave., Chicago
Chilton Co., Chestnut and 56th St., Philadelphia, Pa.
Cincinnati Ball Crank Co., Cincinnati, Ohio
Clark Equipment Co., Buchanan, Michigan
Class Journal Co., 239 W. 39th St., New York City
Columbus Axle Co., 850 E. 72nd St., Cleveland, Ohio
Continental Motors Corp., Detroit, Michigan
Cord Tire Corp., Martin Bldg., Pittsburgh
Cuno Engineering Corp., 80 S. Vine St., Meriden, Conn.
Dalton & Balch, Inc., 2333 Michigan Avenue, Chicago
Dayton Steel Foundry Co., Dayton, Ohio
Diamond State Fibre Co., Bridgeport, Pa.
Doehler Die Casting Co., 505 Cour St., Brooklyn
Dunhameter Corp., 230 E. Ohio St., Chicago
Duro-Brite Co., c/o Marshall Metal, 2608 S. Wells St., Chicago
Eagle Ottawa Leather Co., Grand Haven, Michigan
Eaton Axle & Spring Co., Cleveland, Ohio
Eberhard Mfg. Co., 2734 Tennyson Rd., Cleveland
Eclipse Machine Co., Elmira, N. Y.
Ensign Carburetor Co., 3108 S. Michigan Ave., Chicago
Fitzgerald Mfg. Co., Torrington, Conn.
Ernst Flentje, 1643 Cambridge St., Cambridge, Mass.
Folberth Auto Spec. Co., 7914 Lake St., Cleveland
Foster-Johnson Reamer Co., Elkhart, Indiana
Gabriel Mfg. Co., 1407 E. 40th St., Cleveland
General Electric Co., Schenectady, N. Y.
Globe Mfg. Co., Battle Creek, Michigan
H. A. D. Sales & Engineering, Bronson, Michigan
Hall Cylinder Hone Co., 433 Dorr St., Toledo
L. P. Halladay Co., Eldorado and 3rd Sts., Decatur, Ill.
Edw. V. Hartford, Inc., West Side Ave. and Carbon Pl., Jersey City, N. J.
Robert H. Hassler, Inc., 1545 Naomi St., Indianapolis, Indiana
Hayes Wheel Co., Horton St., Jackson, Michigan
Hercules Motors Corp., Canton, Ohio
Ernest Holmes Co., 700 E. Main St., Chattanooga
John C. Hoof & Co., 157 E. Illinois St., Chicago
Houdaille Co., 1400 West Ave., Buffalo, New York
Hutt Engineering Co., 6913 E. Jefferson Ave., Detroit, Mich.
Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago
Indiana Piston Ring Co., Hagerstown, Indiana
Jenkins Vulcan Spring Co., Richmond, Indiana
C. N. & F. W. Jonas, 528 Transportation Bldg., Chicago
K. P. Products Co., Inc., 50 Pine St., New York City
K-W Ignition Co., 2811 Chester Ave., Cleveland
K. W. Glare Shield Co. of Mass., 46 Cornhill, Boston, Mass.
K & V Rubber Co., Delaware, Ohio
Kehawke Mfg. Co., 421 South 6th St., Minneapolis, Minn.

Will Be at Chicago Show

and Taxicabs

Maxwell Motor Sales Corp., Detroit, Michigan
Moon Motor Car Co., St. Louis, Mo.
Nash Motors Co., Kenosha, Wisconsin
National Motors Corp., Tower Bldg., Chicago
Nordyke & Marmon Co., Indianapolis, Indiana
Oakland Motor Car Co., Pontiac, Michigan
Olds Motor Works, Lansing, Michigan
Willys-Overland, Inc. (Overland), Toledo, Ohio.
Packard Motor Car Co., Detroit, Michigan
Paige-Detroit Motor Car (Paige), Detroit, Michigan
Peerless Motor Car Co. (Peerless), Cleveland, Ohio
Pierce-Arrow Motor Car Co., Buffalo, N. Y.
Pilot Motor Car Co., Richmond, Indiana
Premier Motors, Inc., Indianapolis, Indiana
R & V Knight Motor Co., E. Moline, Ill.
Reo Motor Car Co., Lansing, Michigan
Rickenbacker Motor Co., Detroit, Michigan
Roamer Motor Car Co. (Roamer), Kalamazoo, Michigan
Star Motor Co., 1819 Broadway, New York City
F. B. Stearns Co., Cleveland, Ohio
Stephens Motor Car Co., Moline, Ill.
Studebaker Corp. of America, South Bend, Indiana
Stutz M. C. Co. of Amer., Inc., Indianapolis, Indiana
Templar Motor Car Co., Cleveland, Ohio
Velie Motors Corp., Moline, Ill.
Westcott Motor Car Co., Springfield, Ohio
Wills Sainte Claire, Inc., Marysville, Michigan
Willys-Overland, Inc. (Willys-Knight), Toledo, Ohio

TAXICABS

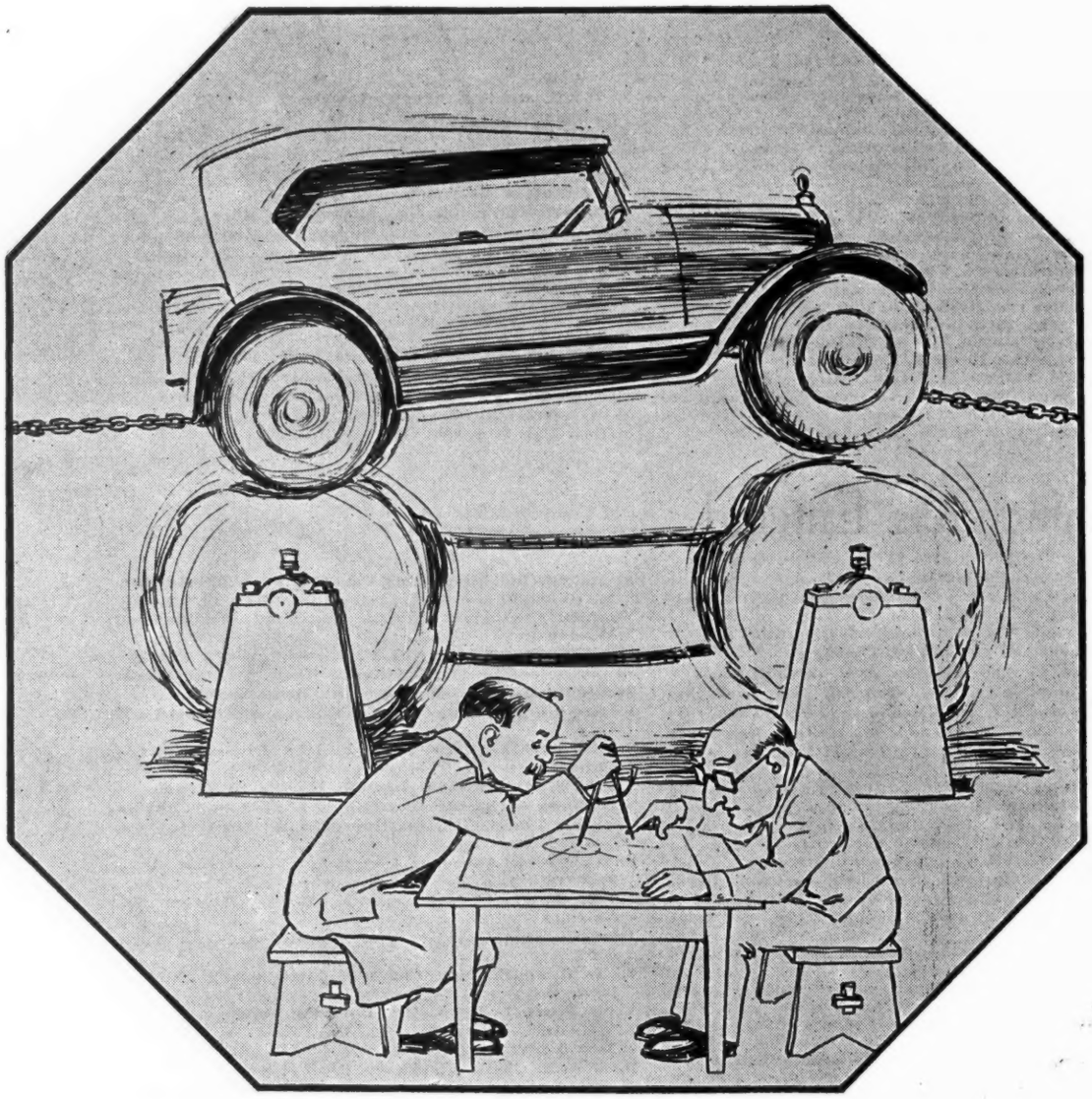
Dodge Brothers, Detroit, Michigan
Premier Motors, Inc., Indianapolis, Indiana
Rauch & Lang, Inc., Chicopee Falls, Mass.
Reo Motor Car Co., Lansing, Michigan
Roamer Motor Car Co., Kalamazoo, Michigan
Willys-Overland, Inc., Toledo, Ohio
Yellow Cab Mfg. Co., Chicago, Illinois

Manufacturers Entered

Kokomo Electric Co., Kokomo, Indiana
Lanton Auto Equipment Co., 4709 Grand Central Terminal Bldg., New York City
Limousine Body Co., Kalamazoo, Michigan
Lorraine Corp., 341 E. Ohio St., Chicago
Lovejoy Mfg. Co., 39 Brighton Ave., Boston, Mass.
J. C. McAdams Co., 145 W. 63rd St., New York City
S. S. McClelland Co., 1926 Broadway, New York City
Manzel Bros. Co., 317 Babcock St., Buffalo, New York
Metal Stamping Co., Inc., 13th and East Ave., L. I. City, New York
Monarch Bumper Mfg. Co., 1622 Euclid Ave., E. Detroit, Michigan
Moto-Meter Co., Inc., 15 Wilbur Ave., L. I. City, N. Y.
Motor, 119 W. 40th St., New York City
Motor Life, 1056 W. Van Buren St., Chicago
Motor Tool Specialty Co., 14 E. Jackson Blvd., Chicago
Murphy Varnish Co., 224 McWhorter St., Newark, N. J.
Nacto Cleaner Corp., 2171 Madison Ave., New York City
Naperville Machine Co., Inc., Naperville, Ill.
National Lead Battery Co., St. Paul, Minn.
N. Y. Wire & Spring Co., Box 43, Uptown Station, Hoboken
Oakes Co., 3019 Roosevelt Ave., Indianapolis, Indiana
Overhead Door Corporation, 6146 Cass Ave., Detroit, Mich.
Pantasote Co., 11 Broadway, New York City
Petroleum Motors Corp., Rockford, Ill.
Perfection Gear Co., 1475 Michigan Ave., Chicago
Perfection Heater & Mfg. Co., 6545 Carnegie Ave., Cleveland, Ohio
Perkins, Campbell Co., 622 Broadway, Cincinnati, Ohio
Pines Mfg. Co., 404 Sacramento Blvd., N., Chicago
Polygon Products Co., 141 Milk St., Boston, Mass.
Wm. E. Pratt Mfg. Co., 190 N. State St., Chicago
Penn Spring Works, Baldwinsville, N. Y.
Prest-All Corp., 68 Hunters Point Ave., L. I. City
Rajah Auto Supply Co., Bloomfield, N. J.
Rajo Motor Co., 1329 Racine St., Racine, Wisconsin
Reus Mfg. Co., Eager St. and Fallsway, Baltimore
Rex Mfg. Co., Connersville, Indiana
Ross Gear & Tool Co., Lafayette, Indiana
Geo. Sachsenmaier Co., 926 N. 3rd St., Philadelphia, Pa.
A. Schrader's Son, Inc., 470 Vanderbilt Ave., Brooklyn
Shakeproof Lock Washer Co., 154 E. Erie St., Chicago
Simplex Windshield Wing Co., 2241 Michigan Avenue, S., Chicago
Simplicity Engine & Mfg. Co., Port Washington, Wisconsin
Snap-On Wrench Co., 14 E. Jackson Blvd., Chicago
Sound Sales Service, 537 Burke Bldg., Seattle, Wash.
South Bend Lathe Works, South Bend, Indiana
S. S. Stafford, Inc., 609 Washington St., New York City
Stewart-Warner Speedometer, 1856 Diversey Blvd., Chicago
Stover Signal Engineering Co., Racine, Wisconsin
Stromberg Motor Devices Co., 64 E. 25th St., Chicago
Superior Lamp Mfg. Co., Inc., 150 W. 52nd St., New York City
Super Shock Absorber Co., Inc., 37 Fairmont Ave., Jersey City, N. J.
C. A. Taylor Trunk Works, 678 N. Halsted St., Chicago
Tonneau Shield Co., Inc., 47 W. 63rd St., New York City
T. N. T. Spark Plug Co., 1966 East 66th St., Cleveland, O.
Trico Products Corp., Buffalo, New York
U. S. Auto Lamp Mfg. Co., Inc., 540 W. 58th St., New York City
U. S. Axle Co., Pottstown, Pa.
U. S. Bureau of Public Roads, Department of Agriculture, Washington, D. C.
United States Chain & Forging, Union Trust Bldg., Pittsburgh
Vacuum Oil Co., 61 Broadway, New York City
Vitalock Co., 1721 Broadway, New York City
Waltham Watch & Clock Co., Waltham, Mass.
John Warren Watson Co., 24th and Locust Sts., Philadelphia
Waukesha Motor Co., Waukesha, Wisconsin
Weaver Mfg. Co., Springfield, Illinois
Wheeler-Schebler Carburetor Co., Indianapolis, Indiana
K. R. Wilson, 10 Lock St., Buffalo, New York
Wire Wheel Corp. of America, Buffalo, New York
Witherow Steel Co., Box 1126, Pittsburgh, Pa.
Wolverine Bumper & Specialty, 514 Bond Ave., Grand Rapids
Yellow Jack-It Mfg. Co., 11 S. Desplaines St., Chicago

NOTE—The accessory list had not been closed at time of going to press and it probably will be considerably enlarged by late entries.

Looking Over the 1924 Car Designs



A CROSS section of the 1924 motor car design reveals some facts interesting alike to dealer, service man and car buyer.

Structurally the 1924 car is a sturdy piece of mechanism. Although four-wheel brakes and balloon tires are the major thoughts which seem to center about our present-day automotive vehicles, there are numerous other things which collectively make cars of to-day stellar performers.

Powerplants are getting smaller and yet we are getting more horsepower per cubic inch piston displacement than in the past. Engineers are striving to get a more uniform output per cylinder. There is much more thought given to balancing reciprocating and rotating parts. As the speed of the smaller engines goes up, it means a more careful design generally and vibration cut to a minimum. The following pages tell of this.

The chassis in general and the body have been improved so that in to-day's motor vehicles we see a more general trend towards durability. Materials seem to be better selected for the upholstery in both open and closed models. Body finishes are more durable; new processes have made this possible.

Although the electric systems have not been changed much this year, there is a general tendency towards better layout of the fitments on the instrument board, and refinements are in evidence all around. The following pages tell in detail of some of the things which ought to make the 1924 car an excellent all around performer and a superior product as compared with former models.

Why the 1924 Car Should Endure

Better Design, Better Materials and Better Production Methods Have Combined to Make Modern Motor Vehicles More Lasting. Many Makers Designing Service Equipment to Go Along With New Models

By B. M. IKERT

"WILL the car stand up?" is the question sooner or later put to every salesman by the prospect out buying a car.

And, will the car stand up is what the same man asks of the boys in the service department after he has bought the car and is, perhaps, still a little skeptical of the car, because it has some "new fangled" ideas about it, which the old car he traded in and which to his mind "stood up" pretty well, did not have.

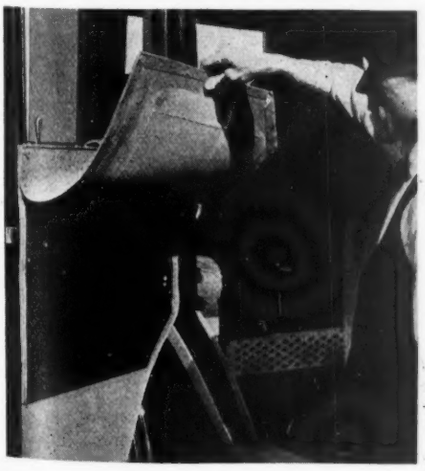
"Do you think she'll stand up pretty well?" is what this man's friends ask him when he shows off the new car. And so on down the line, everywhere, we hear about a car's ability or inability to "stand up."

When an analysis is made of this term "stand up" we find that it is endurance to which these various people allude. It pertains to making the parts of a motor car durable.

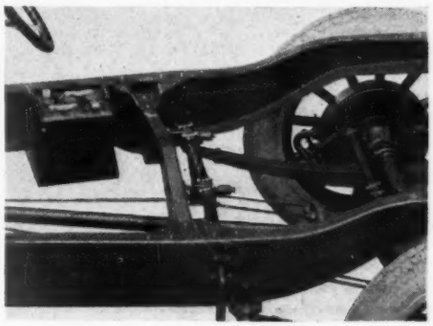
When mother goes out to buy clothes for the children, she picks certain garments because "they get so much more wear out of them" as she says. Looks may enter into the bargain, of course, but long wear, durability, the ability to "stand up" if you please, is what she buys. If this ability to resist wear, to stand up, is combined with good looks and a fair price, so much the better.

How Judge Durability?

But in the motor car, how shall we judge the ability of a car to "stand up." What do we say to the prospect who compares two or three motor cars in about the same price class and then asks "which of these cars stands up the best in service?"



Better material is found in the interiors of motor cars. Where painted cardboard was sufficient in the old days we find real upholstery material, something which will resist wear



Frame breakage is a rare occurrence these days, made so largely by deeper frame members and all around better design. Better materials have given us lighter frames, but frames which stand up much better. The trend towards closed bodies has also had its effect upon sturdier frames

Naturally, it does not require an exceptionally alert mind to know that a car selling for $1,000 will not stand up as well in service as the car selling for $5,000. The former may, with a certain number of overhaulings, run as many miles during its life as the higher priced vehicle, but that is not essentially what is meant by standing up in service.

It is the car which after prolonged use still wears its factory clothes, that stands up. The car which runs much the same after 15,000 miles of travel as it did the first two weeks in the hands of its owner is "standing up." But, right here, we must bear in mind that a car's ability to stand up rests largely with the person who owns and drives it.

The car driven by a careful driver and one who regularly makes or has made the inspections and adjustments the manufacturer insists upon, lubricates the car as it should be lubricated, naturally is going to have a vehicle that "stands up" better than the man who neglects his car. In this respect a medium priced car may outlive a high priced car. The car owner must bear a certain amount of the responsibility along with the manufacturer and dealer.

If the car maker, for example, has made provisions for taking up wear in the spring shackles and the owner of the car never pays any attention to having it done, then it is the car owner's and not the factory or dealer's fault that wear is accelerated and the parts do not "stand up" as they would if given proper attention at the right time.

Material and Workmanship

Durability, dependability or the ability to "stand up," whatever term we choose to call it, is made up of several things as well-chosen and proportioned parts, large bearing surfaces, good material, accurate fits, close tolerances, hardened and ground parts.

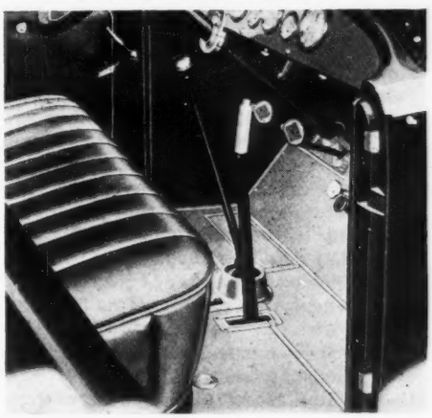
The degree with which these things are used in the factory of the motor vehicle builder reflect naturally in the cost of the product. It would seem right, therefore, to assume that we should see these things in a full measure only in the higher priced cars.

But at this point we must look at another angle, that of production. Production facilities have made it possible in many cases to build cars in the medium price class so that long life is assured. A certain construction may be costly, but when spread over a very large production the cost may be lowered sufficiently to warrant its adoption in even a low priced car.

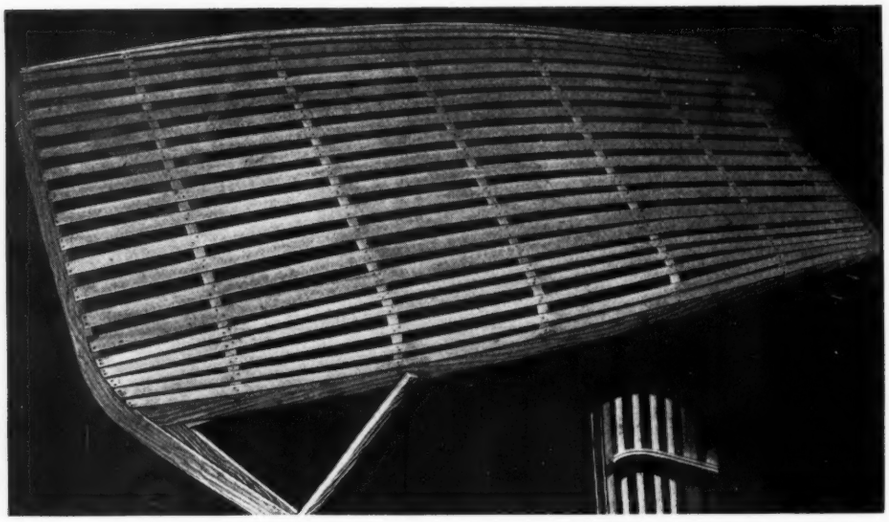
Of course, if cost were no object, it is an easy matter to take most any low priced car and make any number of improvements in it. This would mean an increase in the price of the car when it comes to relatively small production cars, a highly undesirable thing in view of the fact that most of the engineering developments of the future in passenger car design will be with economic ends in view.

People Want Durable Cars

People want their cars to last. Although the publicity bureaus which send out the announcements of the new cars will continue for a long time probably to speak of the vast improvement in riding comfort, of the smart lines and "exceptional values in the chassis," of "compare the specifications of this car with others at the same price" and so on, the



In place of rubber mats covering loosely fitted floor boards in the driving compartments of some cars we find aluminum-bound linoleum covered floor boards which are neatly fitted and readily removable when necessary



With the coming of the permanent top there has been a tendency to make it substantial. Here is shown the construction of the wood framework of the top used on the Gardner car. The seven cross bows are of laminated material noted for light weight and strength

great majority of people who buy cars today are serious minded and want real service from their cars. They want them to last, yes, to "stand up."

In the building of motor vehicles there are three things in common to all. They are:

Design.
Material.
Workmanship.

Anything worth while building is built to a plan. We shall always have with us, of course, the person who can build a house, boat, motor car or a kitchen cabinet without a design or plan. This person works by rule of thumb. Very often he does a fine job, but if it came to building a thing for the market and in huge quantities he fails. He does not work to a plan.

Design Prevents Pitfalls

Design is of value in preventing pitfalls. Many a costly construction is avoided by altering the design. The design of a motor vehicle is something for the engineers, production man, service man and salesmen to shoot at before the car is produced for the market.

Several years ago cars were designed chiefly from the engineering point of view. If the engineering department became sold on a certain design which looked good to them, it went into production. The production department, sales department or service department had little or nothing to say. The engineers knew what ought to be built and it was up to the sales department to sell what they had designed. Also the men in the field, that is, the dealers, had to render service on these cars as best they could.

Flat rate systems of selling repair work was almost impossible in those days. Justifiable prices for such operations could not be established. One of the difficulties was, and still is, in some cases, that on a comparatively insignificant repair job many hours of labor were required to remove and replace units before the job itself could be done and the car turned over to the owner. Under such conditions, obviously it is difficult for any service department to establish a flat rate price that seems commensurate with the nature of the job.

Design Factors Widespread

Design of motor vehicles today is not confined only to the innermost shrines of the engineering departments in our motor factories. It extends into the production department, sales department and also to the service and maintenance departments. It is realized today by every motor vehicle builder that maintenance of the product in the field is fully as important as the original design. Hence, we find that maintenance plays a definite part in the engineering department when plans for a new vehicle are drawn.

The time to make changes is on the drawing board. That's what is being done today. If the boys in the service departments of the dealers have registered complaint that to get the generator off an engine it was necessary to first remove the radiator, the time to consider this is when a new design is being laid down on the drawing board.

In all of our cars today we see examples of where the design has been worked out with maintenance of the product in view. It no longer is necessary on some cars to take off the radiator to install a new fan belt, or take out the entire engine to take up the wear in the rear main bearing.

In fact, so much care is given to the design of several of our cars today that very often things are done which two or three years ago would never have been dreamed of. For example, it is customary on some of the new designs to design equipment for servicing those cars even before they have been put into production. Special tools and machinery are designed and built by the factory and repair systems evolved so that there is every assurance that when that car gets into the field the dealers' service departments will be able to render and sell service intelligently and the customer will stay sold on the car he has bought.

Maintenance in View

The ideal, of course, never can be attained, and this holds true of motor vehicle design as well as it does for anything else. Often a construction which works out wonderfully well in the engineering department will not stand up in production and hence there must be a compromise somewhere. In fact, it must be remembered that our vehicle designs are, after all, a compromise. They must necessarily be so.

Cars must operate in all climates, in level country and in hilly country. Obviously, the car operating in Canada will have a different set of conditions to contend with than the car in Florida or Arizona. The car which will do 80 m.p.h. for the man with a heavy foot who likes to "step on her" will be much too fast for the vegetarian who likes to "hold her around 15." So we have to compromise and give the car a speed range between 5 and 60 m.p.h.

Design, therefore, is largely a matter of compromise. The engineer figures that the man who operates his car under less favorable conditions than a man operating a similar car under very fine conditions, must, theoretically at least, get the same performance. A car which is a good "hill climber" may not be quite as good a performer on the level and vice

Another factor destined to add considerable to a car's ability to stand up is the balloon tire. These tires are capable of absorbing considerably more road shocks which would otherwise be transmitted to the rest of the car, often with detrimental results to the structure

versa. So, the engineer must strike an average and make the car do both fairly well.

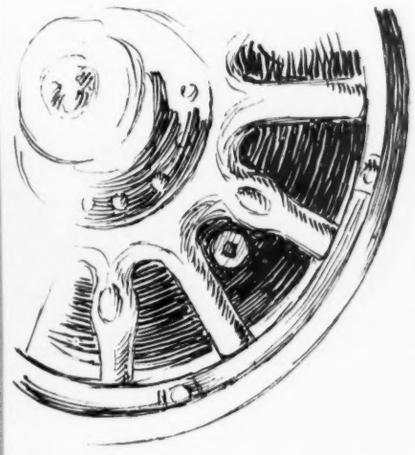
It would be a fairly easy matter to design a car for any set of local conditions, but such a car would be of little use from a national standpoint. It is well, therefore, to remember when we speak of designs that our vehicle makers have compromised so that a car of given design will fit the operating conditions nationally and internationally, serving the greatest number of people possible.

Many Figures Available

Due to the fact that motor cars have operated for a good many years under all sorts of conditions, our engineers have been able to compile figures of great value in determining future designs. Because of what has gone before, it now is possible for the manufacturer of a motor car to practically launch right into the field with a brand new design of car and have reasonable assurance that the car will stand up. It will stand up because mistakes of the past have been corrected—by better design.

The materials which go to make up the present day motor car in the general sense of the word are good. One has but to look back a few years and contrast the number of cases of metal fatigue or breakage then and now. It was not so many years ago that we saw cars laid up on the road with broken steering knuckles, twisted off axle shafts, or a rod which had let go and punctured the crankcase. In those days the car owner had every right in the world to ask "Will the car stand up?"

Along with better design has come the use of better material. In the old days if a part broke it was simply made heavier. The heavier the car, naturally the more costly it became to operate. Then, along with great strides made in metallurgy, came lighter and stronger metals. Alloy steels and better heat treating methods have resulted in giving us lighter cars and at the same time stronger cars.



A car's ability to stand up depends to a large extent upon the ease with which maintenance operations can regularly be performed. In some cars the brake drum has a plug in it, the removal of which affords a hole through which the internal brakes can be adjusted by means of a special wrench

When mother goes to the dry goods store to buy the lad a new suit or something she feels of the goods. She can tell the difference between the goods likely to "stand up" and those which do not. She, like the buyers of motor cars today, wants goods which will stand the gaff. She wants goods which will "wear well" as she expresses it. Likewise the car buyers want cars—and they are getting them—which will "stand up"

Development of Materials

One has but to consider that today a case of a broken motor car frame is a rare item, to appreciate the extent to which materials have been developed. To be sure, design has had something to do with it, for we have learned to make better use of certain materials to insure against such material breaking. But in a large measure, some of the present-day constructions are only possible because of the material development.

Recently a steel manufacturer made the remark that the motor vehicle companies were the most particular customers with which he had to deal. He said they are by far more exacting in their demands than other customers who use steel in any form. The motor car builder demands steel which will bend cold to a great variety of shapes and in order to withstand this strain the steel maker must come through with material which has been developed under trying conditions.

It is well to bear in mind when we consider the performance of our present-day cars so far as their standing up quality is concerned, that the steel manufacturer has done a fine piece of work in putting into the hands of the motor car builder the kind of material his engineers have said were necessary.

The proportioning of materials is vital in making a car stand up. In a complicated piece of machinery like the modern motor car there must be a certain relation between the various parts. The wearing parts must be designed and the materials selected for them so that there is reasonable assurance that the parts will have long life.

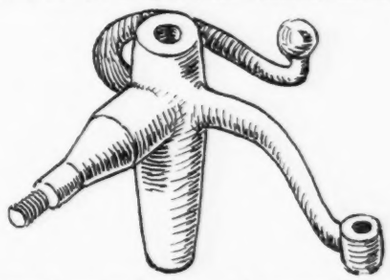
In this respect a study of the wearing parts shows that the engineers have been liberal. In nearly every case a bearing, whether in the engine or any other unit of the chassis, is of considerable size in regard to the service expected from it. Of course, this holds true only if such a bearing receives adequate lubrication, for which most makers have made excellent provisions. Material will only stand up if it is given the regular attention as specified by the car builder.

There has been a tendency over recent years to use a one-piece forging for a certain unit which before was made up of two or three parts. Naturally, the more joints there are in a unit the greater the chance for looseness of the parts and eventual breakage, or even serious accident.

Before we were sure of the lasting qualities of the steels used for motor car construction it was customary to make up units of several individual pieces. In this construction it was felt that should any one part by chance break the unit might still hold together sufficiently to prevent accident. The steering knuckle is a good example of this, where the wheel spindle and vertical member of the knuckle were one piece, the steering arm another and the tie rod arm still another.

One-Piece Construction Knuckle

Compare this construction with the one-piece knuckle used in several instances in today's cars. The one-piece construction is possible because of the faith in the design, the material and the manner of forging. This is but one example. A study of cars will reveal other equally interesting developments along this line.



In our haste to look over the newer designs of four wheel brakes and so on we are apt to overlook some features which are real achievements in design and execution. Here, for example, is shown a one-piece steering knuckle, a part which in the old days was made up of several parts

Advancement of Aluminum

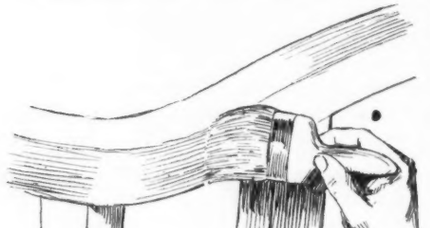
It would be an injustice when speaking of materials not to mention the progress made by aluminum as regards motor cars. While this metal has been used in many parts of the chassis it is in the pistons of the engines where it has made the biggest strides. How does this effect the ability of the car to "stand up?"

Every ounce of weight taken off the piston is worth thirty pounds on the chassis. And because of this reduction in the piston weight, resulting in less weight of the reciprocating parts, naturally vibration is cut down, there is less wear on the bearings and the parts "stand up" that much longer.

There has been a wholesale use of pressed steel parts in the makeup of motor vehicles. This material is relatively cheap, is light in weight and read-

ily formed. There is little likelihood of its crystallizing. Its use is confined to all parts of the car and where formerly castings were used, in a great many instances we see pressed steel parts. It was not so long ago that castings were used, for example, for mounting the power plant in the frame of a car. While this is still the case in some cars today, we see, nevertheless, many engines mounted on pressed steel brackets which are riveted directly to the main frame members. The former heavy cast iron crankcase pan has given way to one of pressed steel or aluminum.

The better selection of materials has not been confined to the chassis alone. The body has come in for its share, also. Heavier and better stock has been used

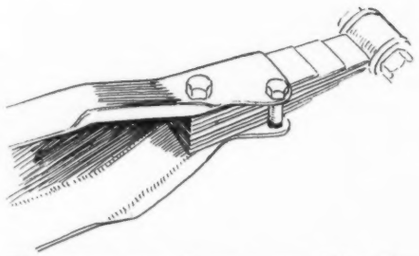


The chances for bodies to stand up are much better in those cases wherein the wood frame is painted before the body panels are put on. Painting the frame prevents moisture from working into the glued joints and loosening them

for body panels and the wood frames for bodies are much better reinforced with malleable castings and brackets to prevent the joints from becoming loose.

It has been found also that bodies stand up much better if the wood framework is given a coat of paint before the metal is put on. This is so because of the fact that glue is used in the mortise and tenon and other joints and unless these joints are protected moisture will work into them and ultimately loosen up the joint. This makes for body squeaks, which often are very hard to remedy. It will readily be understood that water is liable to find its way into the joints of a body frame, as for instance, when the car is washed. Naturally, if the joints are protected by paint and the water cannot find its way into them and the result is the body has a much better chance of "standing up."

In this connection mention might also be made of the treatment given the wood frames of production cars which are finished in a baked enamel. Heretofore, this was difficult, owing to the fact that the frames being of wood could not be subjected to the heat required to bake the finish on the metal panels. But by now coating the wood frames with a preparation known as Oxvar it is possible to place the entire body assembly in the ovens for baking and feel sure that the joints will not be impaired. A wood frame body can be enameled at 400 degrees by this process and it is stated the finish will last the lifetime of a car.



The torque arm of motor cars using them is tucked out of sight, but it is a very important unit. The front end fastening in the old days gave much trouble through breakage and looseness. Here is shown a torque arm mounting which ought to "stay put"

Better material is found in the interior of the cars of today. Even in some of the fairly low priced cars we find aluminum-bound linoleum covered floor boards in place of rubber mats covering floor boards which did not fit any too well. And we find real upholstery material in the places where painted cardboard formerly was used. Where formerly sheet metal was used for seat risers we find wood, not because metal in itself is no good, but because for that particular job wood is better. Manufacturers want their cars to stand up and anything which might induce squeaks or rattles is looked upon with suspicion, because the car owner soon would get the thought that his car was not standing up as he thought it should.

Production Big Factor

Given good design and materials the remaining factor is workmanship, or the shaping of the material—production, in other words.

Along with better design and materials have come better production methods. We see development right through from the raw materials to the finished product. It is difficult in an article of this kind to tell just where production begins and material leaves off or vice versa. Both are closely related and what is said here may at times come under the general head of material or production.

Inspection on incoming raw material has never been so rigid as it is in the factories of the motor vehicle makers today. Examples of this are found in the concerns which formerly only gave either a physical or chemical specification for the steels they used.

Such concerns, particularly axle makers, spring makers and makers of other units subjected to considerable stress are using steel for which they supply both the physical and chemical specifications. The concerns maintain laboratories which take samples frequently from both the incoming shipments of the steel and from the parts in process to see that both the physical and chemical properties are being adhered to by the maker of the steel.

Achievements in Castings

Many castings are made today which would have been considered impossible a few years ago. One of the practices in foundries which has been responsible for better castings and more uniform castings is the use of permanent and semi-permanent molds. More uniform castings make for greater accuracy in the machined parts and consequently tends to make better fits between the various parts, such as the pistons and cylinders, for example, or at other points where the castings must be held to very close limits. The value of uniform castings will be readily seen in the case of machining parts. In a casting which is not uniform when the tool strikes a hard spot it simply rides over the surface and immediately digs into the metal behind the hard spot, giving an irregular surface which is not always remedied in the grinding operation.

Testing Hardness of Metals

There is a marked increase in the use of instruments for testing the hardness of metal. It is important to know the degree of hardness of such parts as piston pins, push rods and similar parts which are subjected to wear. The instrument for testing hardness, in the hands of an expert, tells much about the qualities of the steels. It has resulted in a greater uniformity of the parts produced. And this same uniformity has been secured in production to a large extent by the fact that the ovens used for heat treatment are held to narrower ranges of temperatures.

Until recently it was necessary for men in the heat treating departments to walk up and down in front of the furnaces examining the thermal devices for registering the temperature on the individual furnaces and then flash a warning signal to the man at the control station. Today, automatic devices are used to hold these temperatures to such a narrow range that no perceptible difference can be found in lots of steels coming out of the furnaces on different days or at different periods in a day's run. Uniformity of metals and machine operations which insure the product being fabricated with uniformly good results certainly go a long way to make the present day motor car stand up.

Probably as substantial a reason as it is possible to give for better production of modern motor cars is the development which has taken place in the manufacture of machine tools. Thus, the one factor difficult to control in production, namely, the human element, has been given real thought and each year we find more and more machines doing the work formerly done by hand. Or, a machine has been brought out to perform a certain operation practically impossible without such a machine.

Take crankshaft balancing, for example, or the balancing of other rotating units. One of the reasons our cars stand up better is because of the attention being given to cutting down vibration. And, cutting down vibration is largely a matter of balancing parts, either reciprocating or rotating. And so, to-day it is common to go into the motor car factories and see balancing machines formerly looked upon chiefly as laboratory equipment. It is a case of where laboratory and experimental department practices have been put into

(Continued on page 31)

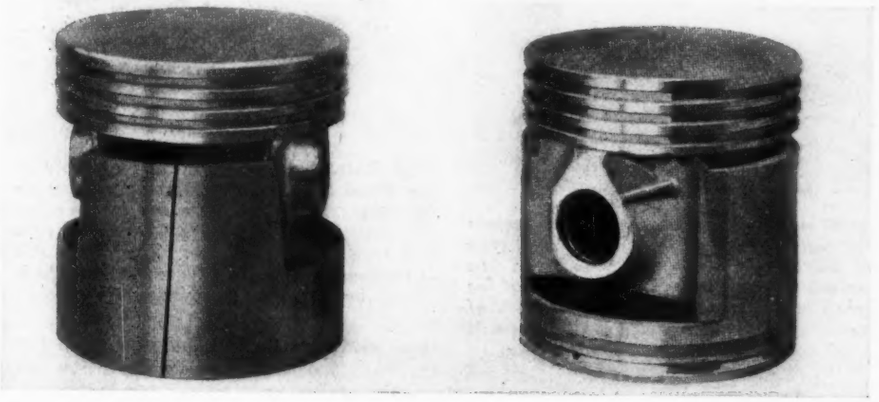
Better All Around Performance Features 1924 Power Plants

Despite Installation of Four-Wheel Brake Mechanism the Average 1924 Car Has a Better Power to Weight Ratio Than Previously. Improved Designs Give a Higher Comfortable Cruising Speed Than Cars of Last Year

By PAUL DUMAS

THE arrangement of the factors of Design, Material and Workmanship in the cars offered for 1924 reveals some interesting developments. Generally speaking, these developments have been along sensible lines and there is a marked absence of the radical. The 1924 car even with its improved performance, is built for greater reliability.

To get a clear picture of what has transpired during the year it is first necessary to discard the idea of year models. Whether or not the manufacturer uses the yearly or series system of models it should be remembered that strictly speaking, all new or additional models announced after February of 1923 are considered as 1924 models. The developments described in the following pages refer then to changes made in the various chassis makes since the second month of 1923. In other words, descriptions are based on new series, or new year, models placed on the market since the last national show season.



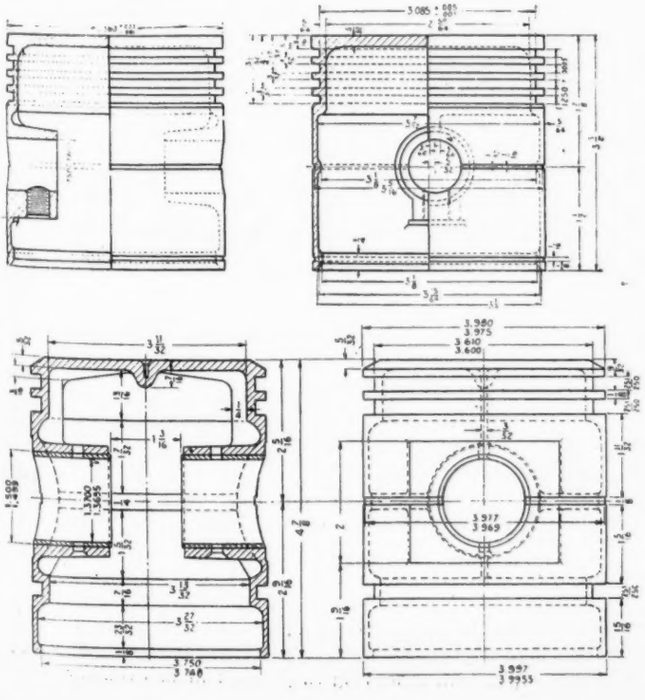
Typical light alloy pistons of the constant clearance type. Some light alloy pistons have the skirt insulated from the head and depend on dissipation of heat through the piston rings

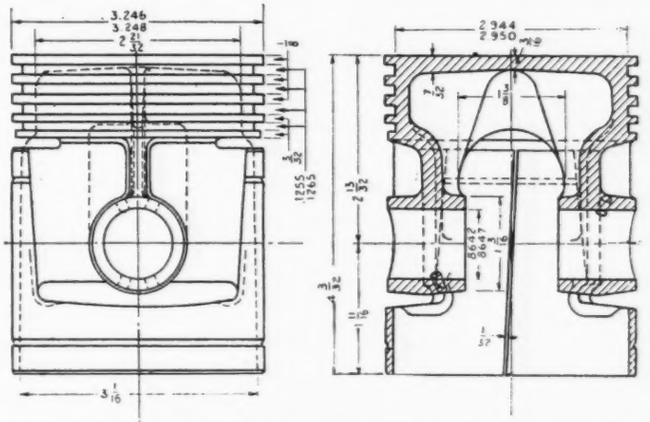
Tires and Brakes Have the Stage

tioned, we find that four wheel brakes and balloon tires hold the center of the stage. The trend curve of the vacuum tank system of fuel feed is perhaps the closest comparison to the probable trend curve for these two developments. With interest centered on two big chassis features the changes in power plant construction have been overshadowed but not entirely overlooked.

Power Plants

It is often said that the average car prospect has no idea whatsoever of car construction and furthermore that he does not care to know. Be this as it may, it is certain that mechanical features have a noticeable influence in car selling. The four wheel brake is fundamentally a mechanical feature and no one can deny the fact that four wheel brakes and new engines have the power to draw prospects to the salesrooms. It is also probable that talking points provided by engine and chassis features oftentimes furnish an opportunity for actual demonstration on the road. Admitting that the majority of buyers pur-

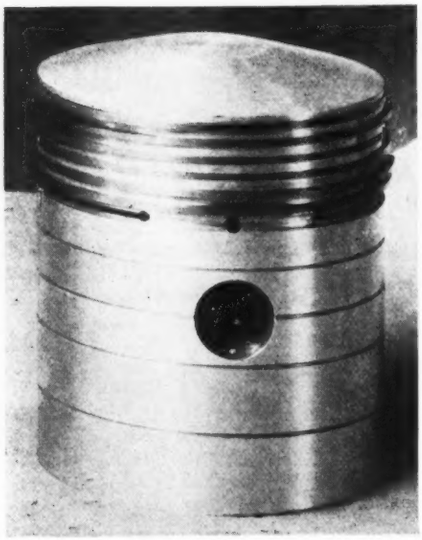




Right: The Hupmobile light alloy piston. Note thickness of head as compared to skirt. This type depends to a great extent on heat dissipation through the rings. Four rings of 1/8-in. face are used

Upper left: Piston used in Packard single six. This type has since been changed to the style illustrated on page 35. "Unusual features of 1924 cars." Both models are noteworthy in that they use the new standard 1-in. face rings

Lower left: Piston of the Hercules truck engine. This is of the conservative barrel design and is made of iron. The rings are wider than usually found on the late passenger car engines, probably because the engine is of the low speed heavy duty type



Piston and ring assembly of the American built Rolls-Royce. This is a split skirt type and carries six rings of .088-in. face. In fractions of an inch this works out as slightly wider than 1/16 in. The depth of rings is approximately twice the face as will be noted by looking at the top ring

chase on the impressions of appearance and comfort, it should be borne in mind that mechanical features are the means of providing that comfort.

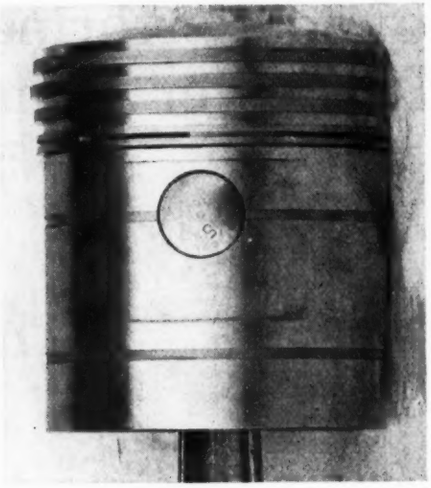
Although there is the usual variation in internal specifications, the new series power plants have many characteristics in common. Generally speaking, they are: MORE POWER PER CUBIC INCH DISPLACEMENT, SMOOTHER OPERATION, and have GREATER REPAIRABILITY. Put into other words, the 1924 chassis has a better power to weight ratio, is easier to drive, has a higher comfortable cruising speed and increased accessibility.

More Power from Same Displacement

Considering each of the three mentioned characteristics separately, we find that increased power output has been secured from the new series engines by increasing the piston speed and by improvements in fuel distribution and utilization. The factors that give smoothness of operation should also be included, but we will consider them separately later on.

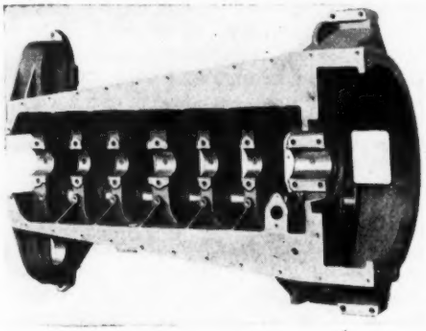
Higher piston speeds have been made practical by lightening and better balancing of reciprocating parts, and also through building greater rigidity and better balance into the rotating parts. Beginning with the reciprocating parts, we find that a tendency for the use of light alloy pistons. In 1922 there were 23 makers using light alloy pistons as regular equipment, out of a total of 123 car makers. The percentage for 1922 figures out at about 18. With 103 makers listed in 1923 we find 28 of them using light alloy, which gives an alloy percentage of about 27. For the year 1924 we find Chrysler and Rollin added to the list and two engine manufacturers.

Although usually associated with high speed and high efficiency types of engines



1924 Stutz six. This is a good example of the trend toward narrow piston rings even by those makers who use the iron piston. The fourth ring is a Perfect Circle oil control type of 3/16-in. face. The piston pin is retained by Toobin bronze buttons which bear against the cylinder wall

light alloy pistons are being used today in engines of every character. The extremes represented by the Duesenberg 8, Chrysler and the new Essex as compared



Sterling Knight six. Example of a well ribbed rigid crankcase. Distortion of the shaft is reduced by the combination of a fairly heavy shaft and the rigidity supplied by seven main bearings

to Rolls Royce, Franklin and Reo give some idea of the wide application of this alloy. Rolls Royce adopted the light alloy piston in 1917 and such big production jobs as Dodge, Oakland, Maxwell and Hupmobile are using them today. There are apparently two schools of design regarding piston material. On one hand are the enthusiasts for the light alloy and on the other we find companies of equal reputation who have remained true to the iron or semi-steel type.

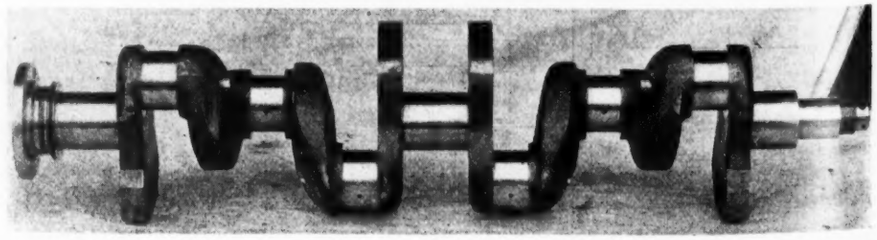
There have been objections to the aluminum piston in the past, but the development of the last three years has produced a light alloy piston that can be fitted as closely as iron. The new style pistons of light alloy are also far superior to the original solid type from a standpoint of wear. If the engine design trend continues towards higher efficiency, higher compression engines, there is a probability of wider use of the light alloy piston. Incidental to this statement, it is interesting to note that 49 per cent of the makers who exhibited at the recent Olympia show in Great Britain carried light alloy pistons.

The Narrow Ring Is Here

In the face of such a lack of uniformity of opinion regarding piston material, there is an almost universal trend towards narrower piston rings. A piston ring wider than $\frac{3}{16}$ of an inch is rarely seen today and the engines of recent design carry rings of $\frac{1}{8}$ inch width. These new $\frac{1}{8}$ inch rings differ from the old standards for this face in that they are practically twice as deep as formerly. In other words, a ring of $\frac{1}{8}$ inch face will require, on account of its thickness, a ring groove depth of close to $\frac{3}{16}$ of an inch. The depth is on an average about 25 per cent larger than the face of the ring.

This gives a bearing area in the grooves of about twice the face area. Additional features claimed are that because of their light weight they have less inertia and consequently have less tendency to pound out the grooves. It also has been found that the tendency

Sterling Knight six. This seven-bearing shaft is one of a type that features 1924 six-cylinder engine construction. The shaft is drilled for pressure lubrication



Stutz Speedway six. A three-bearing shaft depending on resistance to distortion on account of counterweights. The shaft is supported in three main bearings and has pressure lubrication. This is one of the very few three-bearing shafts used in this country

of a piston to rock or slap against the cylinder bore at higher speeds does not produce a convex contact of these narrow rings.

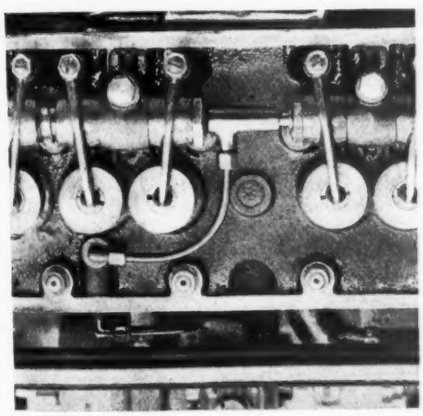
Heat Dissipation

Recent research has shown that considerable of the heat of the piston head is dissipated through the rings. It has also been learned that leakage of both oil and gas is more pronounced behind the ring than at the joint. Better sealing and the practical elimination of one cause of oil pumping have been accomplished by more careful fitting of the ring in the groove.

The practice in some factories is to roll the ring grooves to size while others utilize a machine process of lapping the rings. In both cases the ring groove and the ring itself are given a close grained finish similar to lapping. When fitting the rings to grooves a minimum initial clearance is allowed. This is especially true where the rings are fitted to the light alloy type of piston.

Light Weight Rods

Although there is some tendency towards the light alloy connecting rod,



Stutz Speedway six. Oil under pressure is conducted to the rocker arm assembly. The portion of the piping shown on top remains with the head when removed. A tubing fitting at the side allows detaching from the pump supply

the trend as yet has assumed no great dimensions. Like the light alloy piston the new type alloy rods are found in engines of widely different characteristics. The extremes are realized in Franklin and the really high speed Rollin. In the medium high speed field we find Hupmobile, which has used the light alloy rod for more than a year. In every case the makers who are using light alloy rods also make use of a light alloy piston.

Rotating Parts

Working hand in hand with the lighter reciprocating parts there is a marked tendency towards greater rigidity and better balance of the rotating parts. The crankshaft of the average engine is perhaps the most important and most expensive rotating part. The recent development of very accurate dynamic balancing machines has enabled engine makers to produce a shaft freer from vibration, speed considered, than ever

Cadillac V-63. One and four can never be at top center at the same time on this eight-cylinder shaft. The firing order necessary on account of the crank throw arrangement is: 1L, 4R, 4L, 2L, 3R, 2R, 1R.

previously. Even on the engines that have undergone no noticeable structural changes in the past two years we find that the crankshaft has been improved, by better balancing and sometimes heavier construction.

Practically all of the new series engines carry heavier shafts than previously, and where the shaft dimensions have not increased there is noticeable an improvement in the block or case that supports the shaft. Regarding the number of crankshaft bearing there is still a lack of agreement as to the most efficient number. Previous to 1924 none of the big production cars of the six cylinder class carried more than four main bearings. In the high price class engines with the same number of cylinders invariably carry seven main bearings. That there is a tendency towards seven main bearings this year even in the medium price class is evidenced by the fact that at least five of the new series six cylinder engines are equipped with seven main bearings.

Three bearings are practically standard for the four cylinder engines, and the two bearing shaft is practically unknown today. There are a few cars with four cylinder engines that have five bearing crankshafts, but the tendency in this direction is not as marked as seven for the six cylinder type.

Perhaps the most novel crankshaft development in recent months is the new Cadillac 90 degree throw model. It is claimed by the makers of this car that the new shaft, which necessitates a new firing order, has entirely eliminated cross vibration. In effect the Cadillac engine has the firing characteristics of four two cylinder engines instead of two four cylinder engines at 90 degree intervals.

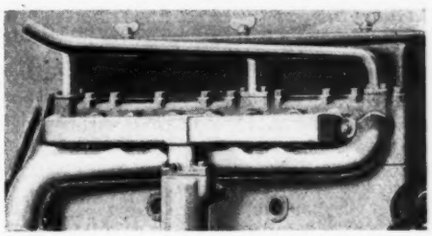
The developments in crankshaft layout can be summed up in saying that they are better balanced, better supported and usually have better finished bearing surfaces than their predecessors. All of these features in the main can be traced to the trend of higher continuous output from a small displacement. The better shafts are a big factor in the higher comfortable cruising speed of the 1924 models.

Connecting Rod and Crankshaft Bearings

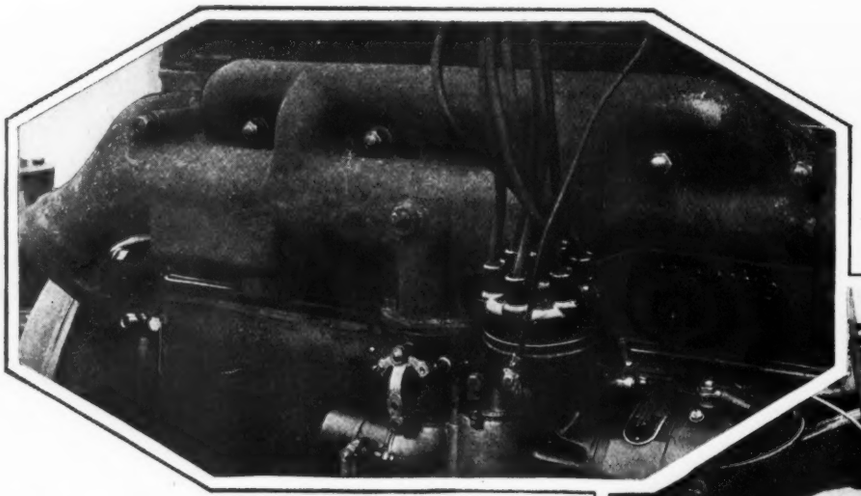
The practice of casting the connecting rod bearing metal directly into the rod and gap is gradually gaining adherents. This is Ford practice; nevertheless, some of the very high speed engines utilize this type of rod bearing.

All of the new jobs with pressure lubrication use either shimless bearings or make use of babbit faced shims. This practice applies to both connecting rod and crankshaft bearings. The successful operation of a full pressure lubrication system demands that the amount of oil leakage between rod and cap or between bearing halves be held to a minimum. The conventional shim cannot be fitted close enough to the shaft journal to give a perfect joint and this accounts for the use of shims with a babbit face on that portion towards the crank pin or journal. The shimless type is gaining favor gradually.

To the maintenance man the rapid increase in the number of makers using pressure lubrication has especialy significance. In maintaining these engines the mechanic should always aim to secure a

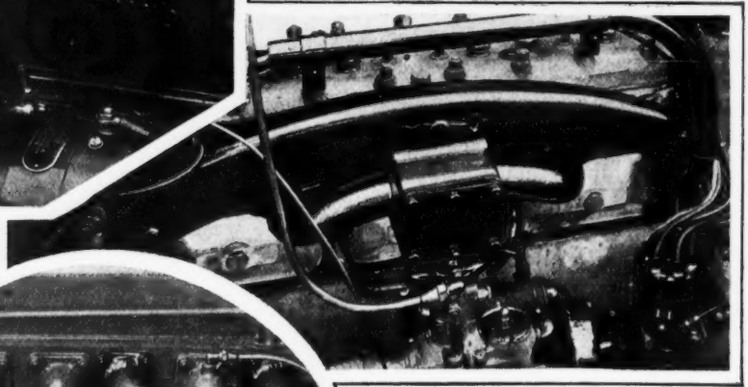


Buick six. An increase in horsepower of 40 per cent over the 1923 engine is claimed by Buick engineers. The inlet manifold as shown is considered a big factor in securing the added power. Note the absence of easy bends and note also that the manifold is of rectangular section. This manifold is typical of a type being developed by the Swan System Co.

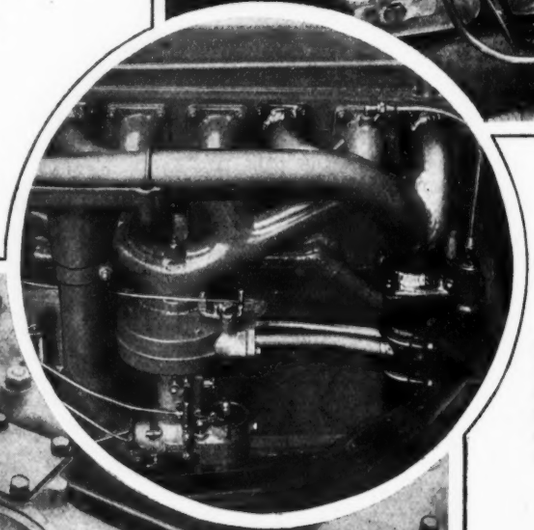


Above is illustrated the Oldsmobile combined inlet and exhaust manifold. The amount of heat delivered to the mixture is not controllable on this hot spot system

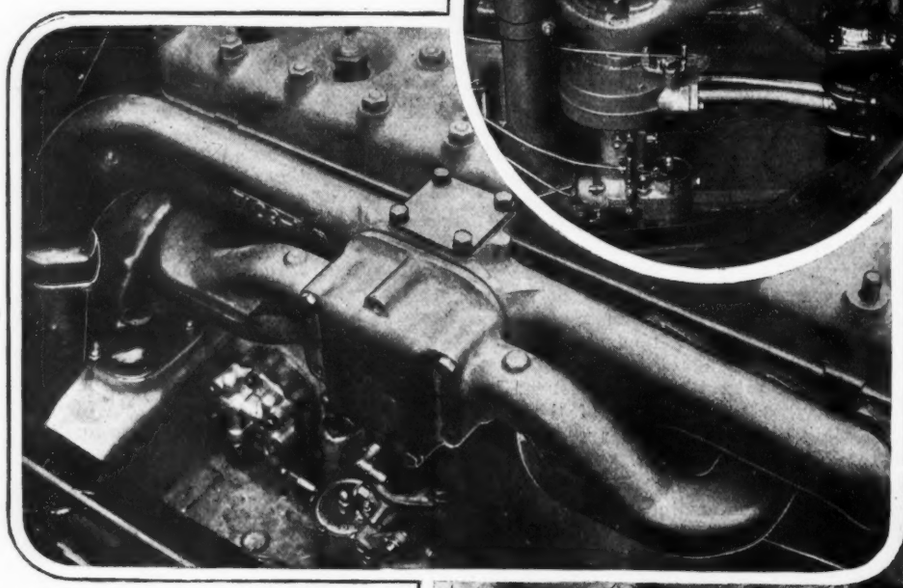
Hot spot installation on the Jordan is shown below. The removable cover plate permits cleaning carbon deposits the accumulation of which would tend to insulate the inlet from exhaust heat



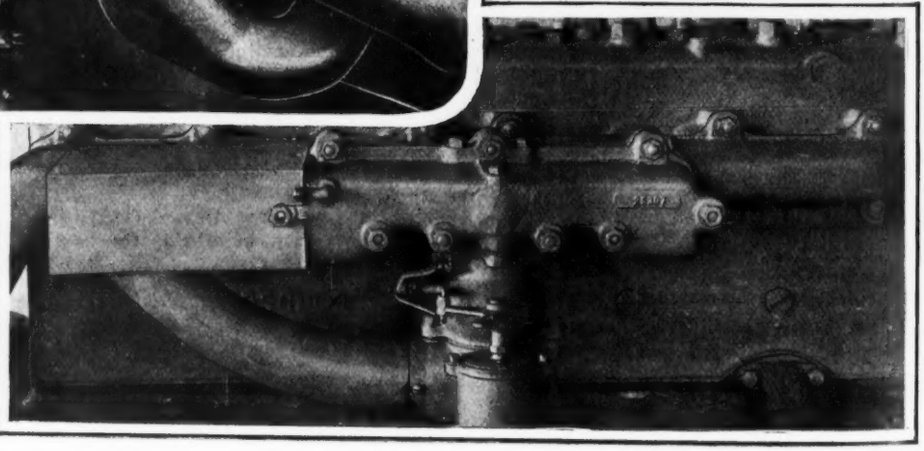
Below the circle at the left is the Chandler adjustable hot spot. A seasonal heat adjustment is provided. The plate shown at the top of manifold uncovers the damper which provides the adjustable feature

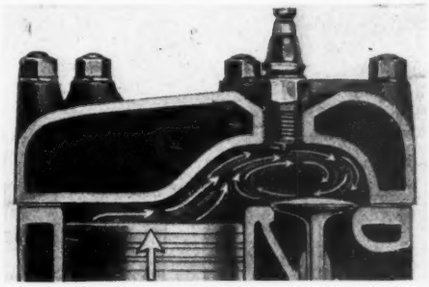


Hot ring installation on the new Marmon in circle at left. This is one of the manually controlled types. The wire shown just above the ring proper connects to a dash control which permits regulation of heat to suit speed or climate



At the right is shown the new Hudson inlet and exhaust manifolds. The Hudson Stewart carbureter is hot spotted by being bolted directly on to the exhaust manifold. This is one of the new carbureter layouts with the choke or strangler eliminated. Hudson calls the enricher an "easy starter." Instead of strangling the air inlet the easy starter mechanism raises the carbureter metering pin which enriches the mixture





Genuine Ricardo turbulence head of the Waukesha truck engine. The arrows indicate the probable behavior of the fluid vapor as it enters combustion chamber. The forming of these eddies brings portions of the unignited vapor in quick contact with the portion initially ignited. The result is combustion completed in a time interval less than usually required

perfectly true, flat, and oilproof joint between each cap and its mating half. The fitting of bearings with this exception will be easier and accomplished in less time in the future on account of developments in crankshaft and bearing manufacture.

Interchangeable Bushings

The type of die cast bearing bushing known as the Chadwick is now used in several installations. The feature of the Chadwick process is close limits of manufacture. With this type of bushing the engine maker has only to fasten the bushings in the rod and case and the job of fitting is completed. The same applies to fitting the bearings in the field, provided that the crankshaft wear has not exceeded certain limits. It is claimed that the replacement of a complete main bearing, that is, upper and lower half, can be accomplished without removal of the engine as usually done.

There is little doubt but what bearings today are far better than two years ago. They run longer without adjustment because of better surfacing of the shaft, and the reduction to a great extent of the distortion to which every shaft is subject. With lighter reciprocating parts and bigger bearings, and the improvements in oiling systems, the unit pressures are reduced noticeably, and the film maintained better than previously.

Fuel Distribution and Utilization

There have been no radical changes in the carbureter itself during the past year. Changes made should be considered in the light of refinements. One old established and reputable maker of carbureters has brought out a new model incorporating a construction that is said to give high mixture velocity at cranking speeds. This is a desirable quality providing that there is no reduction in the volume of fuel delivered at high speeds. It is the claim of this maker that the increase in velocity at high speeds is so slight that it is not sufficient to restrict the volume of fuel possible for any certain manifold diameter.

Substitute for the Choke

There is evidence that the conventional type of choke or air strangler will eventually give way to something different for starting purposes. The objection to the choke is that in order to get sufficient of the volatile or light ends of the fuel into the cylinder many of the heavy and less volatile parts are drawn in at the same time. The less volatile or heavy ends are not readily combustible when cold and their presence in the cylinder tends to produce the effects of dilution.

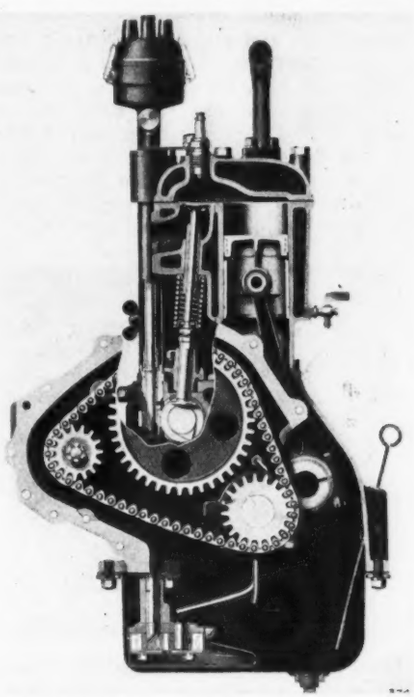
There are at the present time a few cars that carry a mixture enriching device in place of the conventional strangler. The function of the enricher is to either raise a metering pin or in some manner to change the air to gas for starting. Another method of eliminating the choke is to fit the engine with an atomizing primer which injects gas directly into the inlet manifold in the vicinity of the cylinder ports. It might be said in conclusion that the tendency of some drivers to neglect the choke after the engine has started is one of the best arguments for something that will neutralize after the engine is warm, or something that will eliminate the choke entirely.

Air Cleaners

Air cleaners are a recent development as far as passenger cars are concerned. One maker builds his own cleaner, which is of the labyrinth style, while the other outstanding type is the centrifugal. Five cars of recent design are air cleaner equipped and there is every reason to believe that the tendency towards something to eliminate dust from the air intake will be given wire application.

Distribution

One desirable feature of the new series engines is their flexibility and acceleration ability. Generally speaking, these new engines are entirely free from flat spots in the carburetion. Full throttle may be given from extremely low engine speeds without hitch or flutter. In the first place manifold contour has undergone considerable revision. We now have manifolds with decidedly sharp bends, a characteristic which a few years ago was considered contrary to good distribution.



Oakland turbulence head. Note the excellent water jacketing of the cylinder block

The theory behind the newly developed manifold takes into consideration that the fuel as it leaves the conventional carbureter is neither a true vapor nor a true fluid. The tendency of the fuel to pocket and hug the manifold walls has been practically eliminated. By an increase in velocity or due to the sharp bends in these new manifolds the mixture is kept moving, it might be said. Swirling and agitation of the mixture which occurs in the new type manifolds is considered conducive to good results, as it lessens the tendency to wall creepage and condensation of the heavier fuel particles. In some cases the flow characteristic of the manifold has been based on a liquid as the distributed medium rather than a gas or vapor.

Hot-Spots

Practically every engine made during 1923 was equipped with some form of mixture heater or hot spot, as they are commonly known. Generally these hot spots were either an integral part of the cylinder casting or the exhaust header and were non-adjustable.

The new engines retain, as a general rule, the locations of the mixture heater, but their efficiency has been noticeably increased. The increase can be traced to methods of controlling the mixture temperature by regulating the heat given off by the hot spot. On some engines this heat control is varied by raising the hood and closing a damper on the exhaust inlet, while at least one recent model has incorporated the heat control with the throttle control.

It is generally recognized that at wide open throttle and load conditions the heat required is very slight and that the mixture temperature most efficient for slow speeds and no load condition is generally too high for maximum efficiency at open throttle and load. It is for this reason that the hot spot control that is dependent on the throttle opening is receiving consideration.

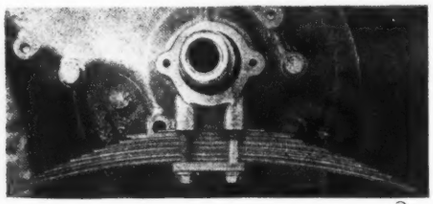
Turbulence

Deriving the maximum expansion effort from a given quantity of gas apparently does not end with the designing of a scientific inlet manifold. The behavior of the fuel mixture after it enters the space in the combustion chamber has considerable effort on its burning qualities and lately there has been much talk about turbulence. Turbulence is a condition brought about by the shape or form of the combustion chamber. The combustion chamber designed to produce turbulence is identified by a contour having the maximum volume over the inlet valve side of the chamber and very little volume or clearance between the piston and head.

One type of turbulence combustion chamber was developed by a prominent

British engineer, Mr. Harry Ricardo, and recently a well known engine manufacturer in this country has purchased the American rights to the Ricardo head. The exact effects produced on the fuel mixture by a combustion chamber built for turbulence are the subject of much controversy. One simple explanation is that turbulence heads cause the mixture to swirl or form eddies and by virtue of these eddies the entire volume of the mixture is brought into contact with the flame of that part of the mixture initially ignited. In other words, it is claimed that these eddies bring about a quicker circulation of the ignition flame and consequently cause a quicker and more thorough combustion. One definite result claimed by the advocates of turbulence is that a higher compression may be maintained with no detonation.

In addition to the one engine manufacturer who has American rights on the Ricardo head, there are some others



Mounting of the front end of the Maxwell is on a conventional laminated spring. Besides relieving the engine of road shocks, it is claimed that this mounting absorbs certain of the vibrations set up within the engine itself

lack of rigidity at the lower speed may pass unnoticed, but at 3000 that same shaft may distort noticeably and vibrate to such an extent that the engine would be "rough" in operation. In extreme cases this roughness may be so noticeable as to make continued operation of the engine at that speed unsafe from a standpoint of parts breakage. In practice the results are usually not as bad as mentioned, nevertheless, the premature wear of moving parts is an invariable effect produced by a rough engine.

From a power standpoint vibration and distortion have very noticeable effects, as both vibration and distortion consume energy with a consequent loss of available engine power. By lighter reciprocating parts, better balancing and more rigidity of rotating parts, this loss of energy is coverted into available power. The engine is allowed to turn at a faster speed without vibration and by turning faster more expansion effort is secured in the same time interval. The result is noticeable in all the all around performance of the chassis. Where roughness of the engine was noticeable at 40 miles per hour previously, the new engine will drive the car at 50 or more without trace of roughness, and all this without any change in axle ratio.

Front End Drives

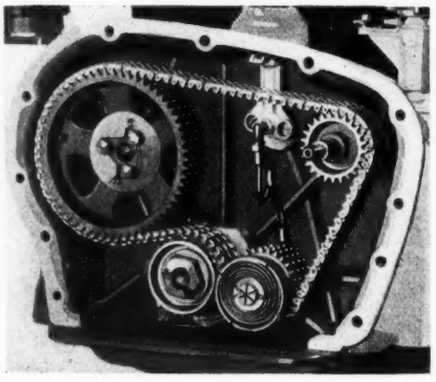
It is not unusual to see a tendency even on the part of the popular priced manufacturer to give more attention to the front end drive. Where chain drive is used, and there is a trend towards this form of drive, the layouts are simpler and adjustment is easier of accomplishment. Both sprockets and gears on a few cars are now balanced just as carefully as the engine flywheel. One chain maker provides a special sprocket incorporating an automatic chain takeup and a vibration damper. In the installations where gears are used, the center distances are accurately maintained and several makers utilize composition gears.

Disregarding all engineering factors involved, a form of front end drive that does not require very fine and accurate calculation of the center distances is a good one for the maintenance depot. There are still shops where the bulk of bearing work is done by hand and when a bearing is refitted it is not unusual to remove as much as 0.12 of an inch from the upper bushing. Now, with certain forms of front end drive, a variation of as little as .005 in the center distances between cam and crank will cause noisy operation, and any form of drive that will remain quiet with such center distance variations is ideal for the repair man and owner alike.

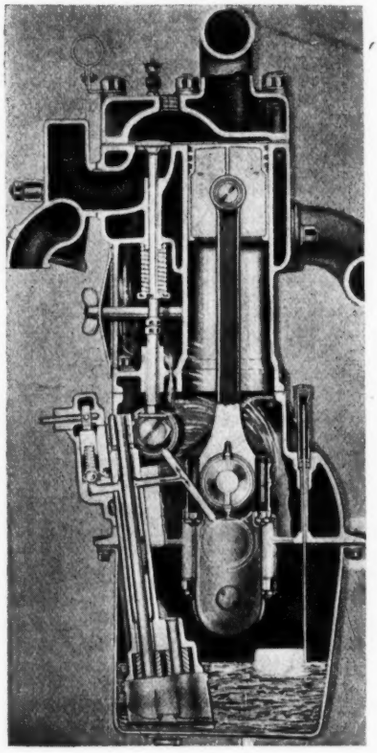
Repairability

The new power plants have better repairability both internally and externally. As an example of the truth that accessibility can be built into an engine without sacrificing performance, the detachable cylinder head offers a good argument. The engines of today, whether low or high priced, are rarely built with a solid head. From a designer's viewpoint, the detachable head is better because it permits of uniform combustion chambers and better water passages. Viewed from the standpoint of the repair man, the advantages are too well known to require mention, and the same can be said of various other features of the modern car power plant.

The tendency towards interchangeable connecting rod and main bearing bushings as previously mentioned is bound to eventually have its effect on maintenance procedure. No one can deny that the cost of replacing a single main bearing is too high compared to other engine operations. It is not the fault of the repairman, but the car owner is always inclined to hold it against him for such



Front end layout on the Paige. The sprocket at the lower right acts as a vibration damper and automatic chain takeup. Note that the back of the chain is used



Turbulence head of the Lycoming four-cylinder engine. This engine is one of the few five main bearing jobs made in this country

whose recent engines have been designed with heads intended to produce turbulence.

Smoother Operation

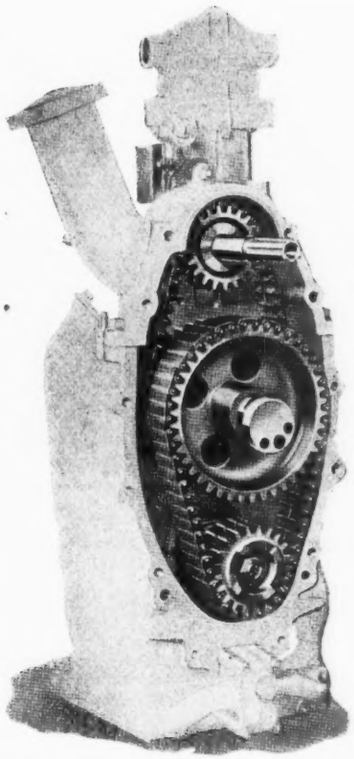
In the final analysis it can be safely said that many of the features that have produced smoothness of running have also brought about greater engine power, and vice versa. Consider, for instance, the engine crankshaft, a shaft that is suitable for a given size engine at 2000 r.p.m. may be entirely unsuitable at 3000 revolutions. A slight unbalance or a apparently exorbitant maintenance charges.

With a very few exceptions the connecting rod assemblies of the present day engines may be removed without disturbing the crankshaft or cylinder block. This is an item that has considerable effect on general maintenance, and coupled with improved bearings will be a benefit for all concerned.

Among the things called new are removable tappet assemblies. They are, strictly speaking, old stuff, and examination of several of the well known cars of 1917 and even earlier will prove this statement. A removable tappet or group of tappet assemblies is desirable for maintenance reasons and the incorporation of this old feature in the new jobs is a noticeable tendency.

Externally the news jobs are more repairable in that nuts and bolts are not hidden in inaccessible corners as previously. Practically any nut or fitting on the late engines can be adjusted or removed with either an end, or common socket wrench.

At least one car manufacturer has



Chain layout on the Cadillac which is considerably simplified as compared to the 1923 model. No adjustment is provided as it is claimed that the greater smoothness of the engine and increased width of chain make adjustment unnecessary

given some consideration to the fact that the average car is not always in the official dealer maintenance establishment. This particular maker is aware that the diagnosis of trouble in the electrical system will be facilitated if a wiring diagram is available. The car in question, which is the new series Franklin, carries a metal plate on the dashboard, as suggested in MOTOR AGE two years ago. This plate has the wiring diagram stamped on its face and also contains the valve timing information necessary for the average mechanic and in addition is stamped with the recommended tappet clearance. With touring on the increase it would seem that other car builders would be furthering their interests by a similar scheme.

Among the other items that would facilitate maintenance would be the installation of a shut-off valve in the fuel line between carbureter and vacuum tank. There are a few cars so equipped, but the percentage is not as high as desirable. The need of this valve is self-evident to any one who has ever been called on to clean a carbureter.

Flywheel Ring Gears

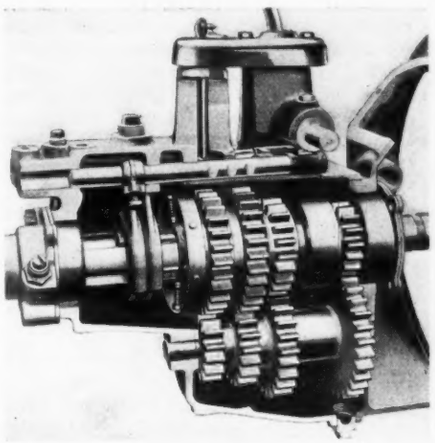
The medium and low priced cars with the exception of Ford, do not as a general rule equip their flywheels with a steel ring gear. A cast or malleable flywheel with teeth cut intergral is not ideal and regardless of the theoretical strength of a cast tooth of average section, these teeth strip in service. The use of something besides teeth cut into an iron flywheel is a need that can not be long overlooked.

Some makers in the higher priced classes make use of a steel flywheel with teeth integral and apply a hardening process to the teeth. Still another engine of recent design makes use of a steel plate flywheel with teeth integral. There is reason to believe that both of these methods are far superior to the old-fashioned iron flywheel with teeth integral. For the maker who has reason to use iron there are available steel ring gears which may be bolted or shrunk over the iron face. Owners who have stripped the second and third set of iron teeth are inclined to purchase the replacement steel ring gear because the labor involved in replacing a flywheel is no small item.

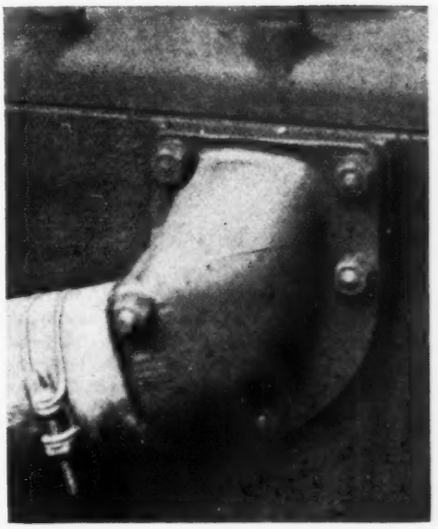
Clutches and Gearsets

The disc clutch has an overwhelming majority this year. Of all the cars listed for 1924 that have national distribution, only two are equipped with cone clutch. It is interesting to note that one of these is the highest priced car built in this country and that the other is the largest production job next to Ford. There has been little change in clutch design recently although gradual refinement has taken place during the past two years. Due to compounding of leverages the foot pressure required for actuation of the clutch is considerably less than previously.

There has been no great trend towards the use of a clutch brake, but practically all makers have lightened the driven parts and with positive release the tendency towards spinning has been noticeably lessened. Lubrication of the clutch pilot bearing has been given more study than ever before and the present tendency is to make use of the engine oiling system, use a chassis pressure type lubricator, or to install an anti-friction bearing. A small hole in the end of crankshaft enables oil to reach this bearing and lubrication in this case is of course automatic. The clutch yoke or throwout bearing has had a similar refinement.



Campbell transmission of the Chandler. Sliding keys engage the gears which are always in mesh



An example of exterior repairability is seen on the side water fitting of the Essex six. Generous fillets allow use of an end or socket wrench of standard dimensions

Gearsets

The gearset of 1924 remains substantially the same this year. Perhaps the recent cars are a little quieter as regards noise on first and second gears, but with the exception of one maker nothing like a major change has been made. In some cases noise has been reduced by using gears of different pitch and tooth contour, others have changed the type of bearing to secure quietness.

The Campbell transmission, which is the only major gearset development of the year, has been previously described in MOTOR AGE. The construction of this device is such that clashing of gears is eliminated and it is claimed that shifting down is as easy as shifting up.

Maintenance and the 1924 Models

The man engaged in maintaining the 1924 cars will find nothing puzzling or complicated.

The new jobs, with the exception perhaps of the front wheel brakes, do not contain any more parts than their predecessors. There is one thought that should be kept in mind, however, and that is workmanship. The new power plants have one feature in common and that is better performance. The performance has been built into them in various ways and in order to maintain the original performance the mechanic must to some degree duplicate the factory standards of workmanship.

We have faith in the American maintenance dealer, but as a 1924 resolution would suggest that every man engaged in the business read and study more about his job, let us have one standard of workmanship in the maintenance establishments and one standard of business methods. 1924 represents the best market for automobile maintenance that the industry has ever experienced, and if maintenance procedure is given the thought and effort that a business enterprise is entitled to, 1924 will be a banner year.

Electrical Systems Little Changed

The Trouble-Shooter's Job Is Not Much Changed on 1924 Cars, But the Appearance of Electrical and Other Instruments Is Much Improved

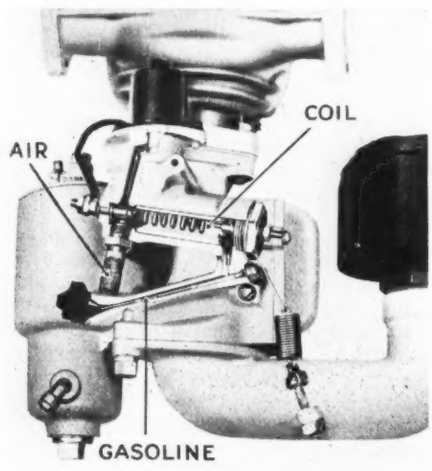
By A. H. PACKER

THE makers of motor cars seem to be busy improving the appearance not only of the car as a whole but of the electrical and other instruments and the way they are placed on the cowl board. A certain maker of tooth paste once advertised that it could not improve the paste so it improved the tube. Perhaps some such thought has been the motive behind the cars and their cowl boards, for the recent improvement is remarkable.

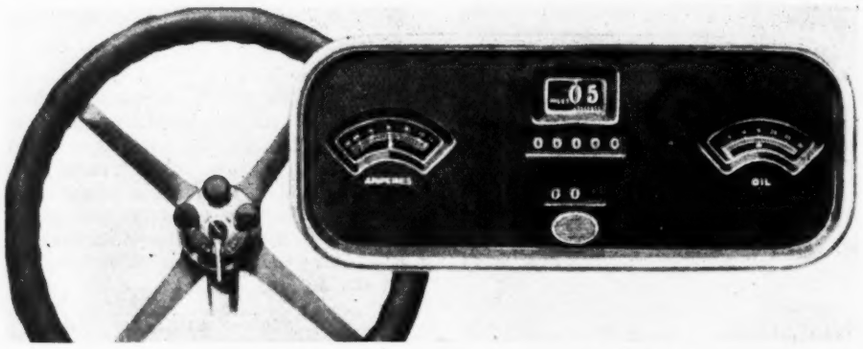
Combining the Instruments

A marked tendency is shown in many cars toward combining the instruments, often under one glass, and in this work some thought has been given to the lighting question and the elimination of glare from the instrument board which tends to make it difficult to see the road. On the Oakland, for example, all instruments are under one glass located in the center of the cowl board and the lighting is from a bulb behind the cowl which illuminates the dials of the instruments without the possibility of shining in the eyes of the driver. The effect is really quite striking and gives somewhat the appearance of a watch with radiolite dial.

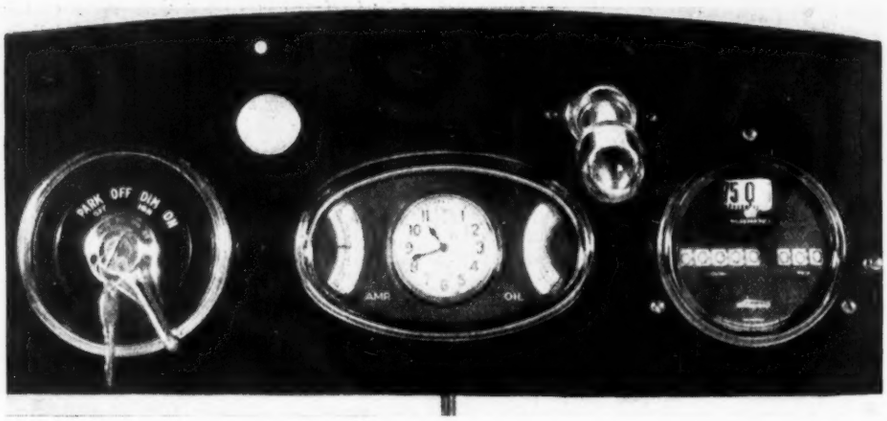
Marmon is another example where unified appearance has been attained in locating the instruments under one glass, this one big instrument including the clock, oil gage, gas gage, ammeter and speedometer. A compromise between centralized location and the use of the whole cowl board for instruments is seen on the Willys Knight where the ammeter, clock and oil gage are under a central glass while at the left is the ignition and lighting switch and at the right the speedometer, giving a balanced appearance to the instrument board as a whole.



The electric vaporizer in the Franklin carbureter



On Oakland the instruments are all under one glass and illuminated by an indirect lighting system. The controls are in the center of the wheel



Ammeter, clock and oil gage are combined under one glass on the Willys Knight

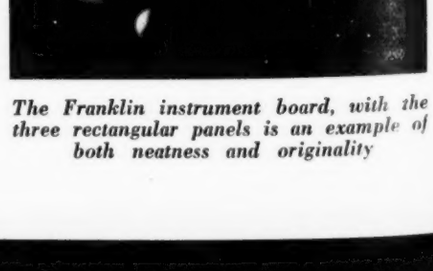
Three Instrument Panels

On the Franklin cowl board the arrangement of instruments is somewhat different from the arrangement being generally used. Three rectangular panels are used, the one at the left containing the switches, the center one having the cowl light and auxiliary spark retard lever, while the panel at the right has the clock and speedometer. The panel with the switches includes one that operates the electrical heating coil in the carburetor, while in the center of this panel is a handle which controls the carburetor mixture adjustment.

Better Headlights

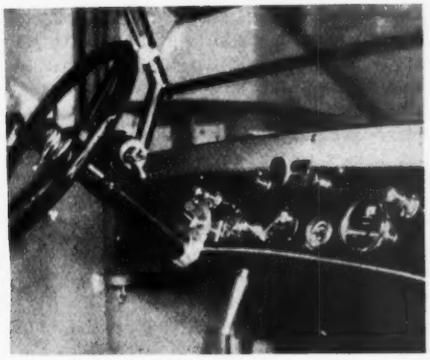
"And I see you have special lenses to cut down the glare," I said to the service manager at one station. "Yes," he said, "But they do not mean anything. If you try to drive against them you know what I mean." Lenses of special design are doubtless helpful in cutting down headlight glare, but they are not the last word in this problem by any means. Flattening out the beam of light to spread it and get it on the road would seem to logically begin at the reflector itself and this has been recognized on Chandler, Cleveland and some other cars on which fluted reflectors are used.

Another way of getting satisfactory road illumination, which while not new, is used in a number of cars. It is to tilt the reflector either mechanically or electrically. Cadillac and Lincoln are good examples of cars in which mechanical means are used to tilt the reflector, while on Franklin and Wills St. Claire cars an electro magnet tilts a central



The Franklin instrument board, with the three rectangular panels is an example of both neatness and originality

An electro magnet tilts the center of the reflector on Franklin headlights



On McFarlan cars the lighting and ignition switch is on the steering column

portion of the reflector. The normal position of this central portion is such that the beam of light is directed downward which is best for ordinary conditions. For high speed night driving on a country road, however, the electro magnet can be brought into play to direct the rays farther ahead of the car.

Convenience and Utility

Some time and some place the best of cars require the services of the shop, perhaps in an obstinate mood, when a shop is not available. Then is the time when a loose wire which has caused a light to wink or a plug to miss may be more easily located if a trouble light is available. The shop mechanic, called out at night on a trouble job, also appreciates the forethought of the designer, when a trouble light is made part of the regular equipment. Such lights are not general, but the higher priced cars usually have them. The front of the dash is the usual place, so that in the normal position the engine is illuminated. Then if the light can be pulled from its socket and is supplied with extension cord and reel for rewinding, so much the better.

Lights in Back

Time was when the attention was concentrated on head lamps, sides and spot lights which all had to do with the front of the car. But times change and the rear of the car is now coming in for its full share of lights. To the tail light was added the stop light, in deference to the closed car requirements. Then came the parking light and later the backing light as exemplified on Wills St. Claire and Cadillac. With progress in this direction there seems to be a tendency to combine the tail, stop and backing light into one pleasing assembly, the arrangement on Cadillac being representative of this plan.

Steering Wheel Does More Than Steer

With the centralizing of instruments under one glass has come to some extent a move in the direction of putting on the steering wheel the miscellaneous controls that would be left over and which are not suitable for cultivation under glass. On Oakland, for example, the horn button, mixture control, choke and lighting and ignition switch are located in the center of the wheel, while it is not uncommon to find the lighting and ignition switch located on the steering column just under the wheel, Reo and McFarlan being typical examples of this practice.

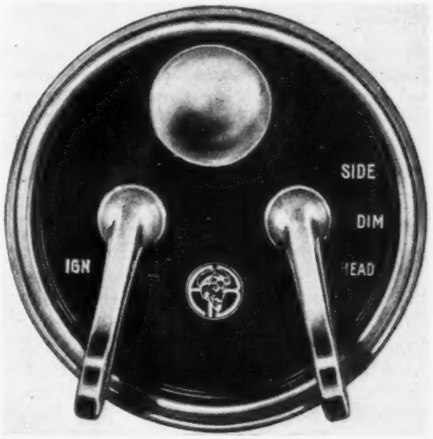
In the case of the Essex Six a novel construction is used whereby the horn button is included in the lighting switch, which is easily reached with the right hand.

More Automatic Advance

The trouble shooter who tries to advance the spark lever on the Essex Six will have a hard job, for "they ain't no sich animal." The American Bosch governor built into the distributer unit takes care of the advance of the spark in proportion to the variation in engine speed, and does a much better job than the average driver would do. On Oakland cars similar construction is employed except that provision is made for easily adjusting the ignition unit a slight amount in case it is found that under average conditions the spark is either too much advanced or retarded.

In one of the illustrations this construction is shown. The ignition unit is set in a socket and held down by a clamp and cap screw. The tighter the cap screw the greater the friction and the harder it is to turn the unit. On the forked clamp are graduations and on the ignition casting a web which is pointed so as to indicate the position of the unit with respect to the graduations. The user of the car will then be able either to take the unit out and replace it again, with the timing exactly the same, by noting the position of the web on the graduations, or he will be able to change the timing slightly to suit conditions of driving, weather or fuel.

Other exponents of the automatic advance construction make provision for changing the timing slightly by hand for certain driving conditions, such as very slow going or for heavy pulling. One



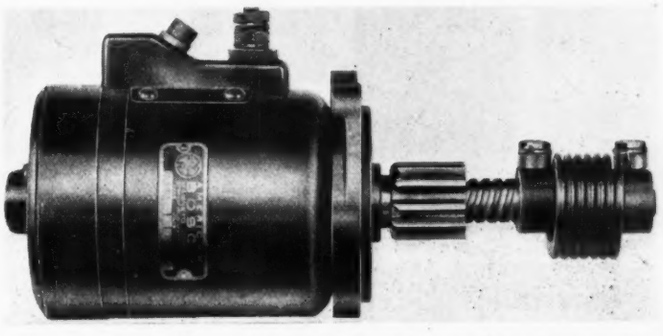
The horn button is located on the Essex six ignition and lighting switch

such installation is shown in the same illustration which illustrates the Franklin cowl board. The spark retard lever is just under the cowl light in the center panel.

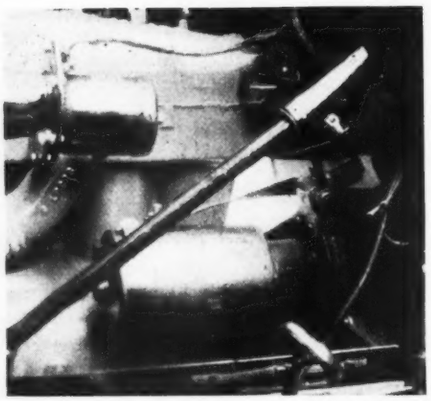
Simplified Starter Circuits

A minor change electrically is seen in the move to eliminate one of the starter cables. This is done by locating the starter switch on the motor itself. Of course the same object has been accomplished for some time on Delco systems where the battery was directly connected to the starter, and the raising of a starter brush served as a switch. With Bendix drive starters, however, the direct connection is comparatively recent.

One illustration shows the Essex starter with switch located right over the starter terminal so that this terminal is not to be seen, being under part of the



The starter switch is an integral part of the starting motor on the Essex six



The starter switch on Maxwell. It is mounted at the rear of the starting motor and operated by a lever on a cross shaft. The cross shaft is controlled by a pedal. This construction eliminates one starter cable, a copper strap connecting the switch to the starter terminal

switch. The only terminal that shows then is the terminal of the switch which is connected by a cable to the battery. This construction cuts the cost somewhat at the factory and also reduces chances of poor connection in the starter circuit. The same construction is used on Hudson, Maxwell and Chalmers. On the Maxwell and Chalmers the switch does not cover up the terminal of the motor, but is near enough to it so that a short bare copper strap serves as a connection and another piece of cable is not required. With this system it is of course necessary to have mechanical connection from the starter pedal on the toe board to the switch on the motor.

With Wiring Trouble, What

Even with the best of construction, when the car has hit the gravel for many thousand miles, there comes a time when on some dark night, there may be a flicker or flare, some trouble or other that requires putting in at the nearest shop.

Suppose it is your shop to which the traveler comes and the car is one whose wiring is spaghetti to you. What a difference it would make if on the dash you would find a metal plate with the diagram nicely engraved upon it.

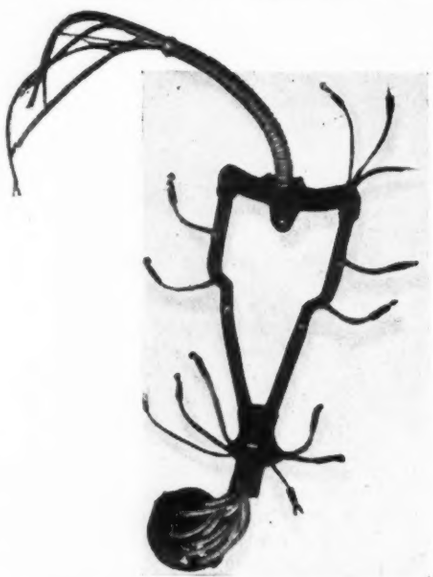
Little trouble then to note the symptoms of trouble, study the diagram and from your general knowledge figure out where the trouble is.

Franklin cars have such a diagram on the front of the dash, where the mechanic lifting the hood and looking under on the right side of the engine can not fail to see it. Not a talking point, perhaps, when first showing the car to the prospect, but certainly appreciated when the car has become an old friend and the time comes when the system requires some work done on it.

A step in the same direction has also been taken by Nash and Dort in putting on a plate which gives the firing order and the valve tappet clearance.

The Wiring

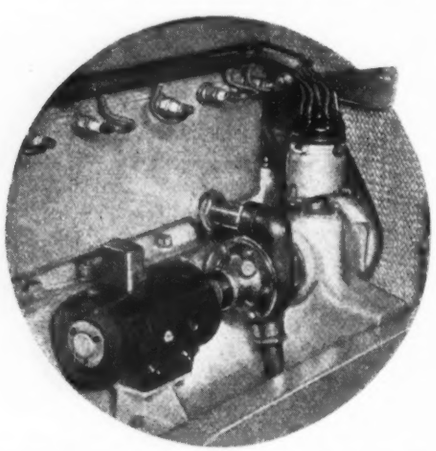
Perhaps the most common kind of wiring on the cars is the armoured cable where the wire is wound with a strip of metal to protect the insulation. Even better than this is the conduit and junction box construction occasionally found, for it is possible to have pressure on armoured wire push the protecting strip through the insulation so that a ground is produced. Such trouble is hard to locate for the leakage is usually slight, the current having to go through the spiral armour to the frame of the car, and this resistance reduces the amount of current leakage, whereas a definite short would be located by its effect in burning a wire or blowing a fuse.



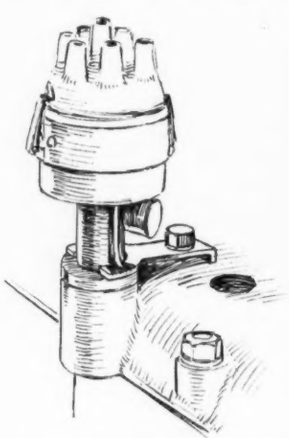
A neat installation, but one that in a few years will make electrical fiends use some of Bill Fixit's trouble shooting tricks

One apparent attempt to get a wire heavily covered and yet without the hazard of the armoured type is seen on Stearns cars where the wiring has the appearance of miniature fire hose, the regular insulation apparently being covered with a layer of woven canvass.

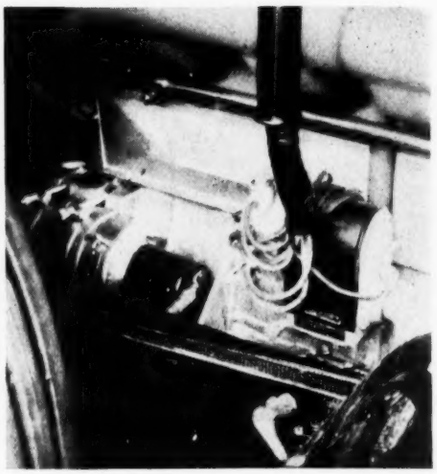
Some of the cars use wiring assemblies in which a large number of individual wires are built into one cable, with the ends coming out at the right point for proper connections. One of the illustrations shows such a wiring assembly which makes a neat appearance on the car, but may give the electrical expert



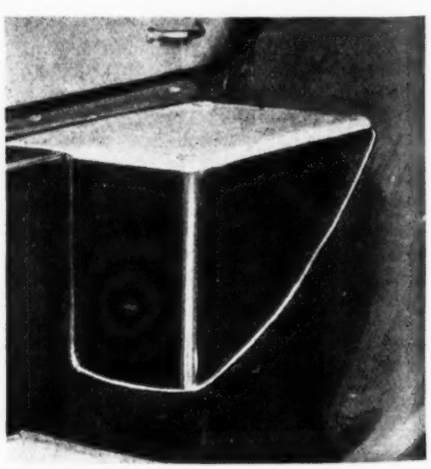
The Juice Expert heaves a sigh of relief when he sees a simple generator and ignition installation as shown on the H. C. S. The feeling of relief is also felt by the owner when he sees the nominal charge for removal and installing



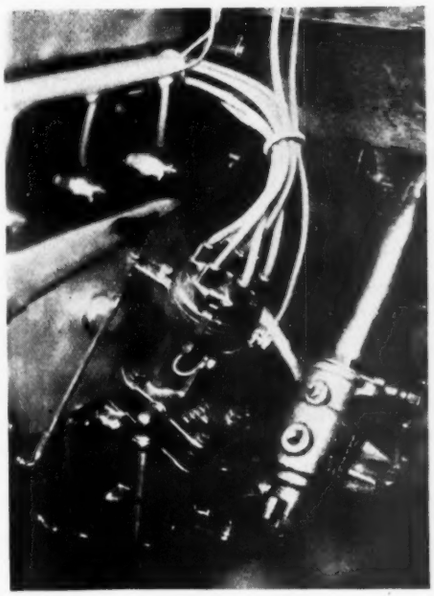
Graduations and an indicator web make it easy to make slight adjustments on Oakland ignition timing



Of the three plugs, firing at once, in each cylinder on McFarlan cars, two get their sparks from the Splitdorf double magneto



On the Packard Eight, the removal of four screws makes the battery readily accessible. The box built into the fender also presents a pleasing appearance



On some cars the vertical shaft drives both the ignition and oil pump. As an example the Dort is shown

something to worry about in years to come, when he comes to trace out the circuits.

Ignition Systems

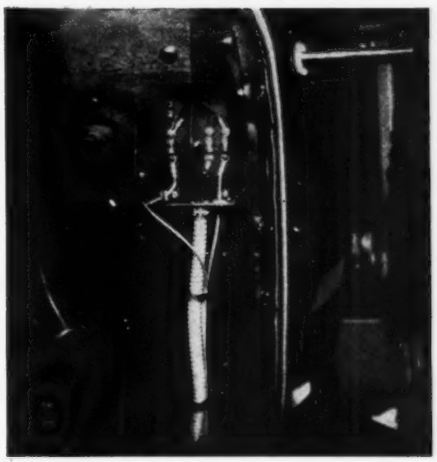
On most cars battery ignition prevails with a trend as previously mentioned in favor of automatic advance without manual control, this being noted particularly on high speed engines. McFarlan used both magneto and battery ignition, combining a double Splitdorf magneto system with a Westinghouse battery ignition system, so as to fire three plugs in each cylinder.

The installation of the ignition unit has not varied much in the last year, many of the cars having separately mounted units while a large number of cars use the generator for driving the ignition. From the service man's point of view the separate installation is preferred for it makes possible the running of the car when the generator is off.

On the Dort Six the ignition unit is driven by the same shaft which drives the oil pump, and this unit is mounted just above this pump.

Making It Easy for the Owner

The electrical system as a whole does not require much attention. The battery, however, is an exception and requires inspection and the addition of water about every two weeks. This means that the battery should be quite accessible. On most cars the battery is under the floor or under the front seat and these locations vary in accessibility on different cars. On the Packard straight eight a departure is noticed, however, from standard practice, for a location has been found which makes the battery accessible, and at the same time the box in which the battery is placed is so designed that it enhances the appearance of the car. The lower portion of the right front fender where it joins the running board has been made to hold the battery, the box being fitted with an aluminum cover which is attached with four screws.



Conduit and junction boxes represent the best wiring practice

Another thing that bothers the car owner is finding the location of a fuse that has burned out. On some cars the fuses are located in a box the cover of which is plainly marked. In other cases the fuses are not easily found. We find, however, that some engineers not only design and place the fuse box so that it can be easily located but they also incorporate an extra clip or two for carrying spare fuses where they will not get lost, and will be available when needed. On one car where this general idea was embodied they even had sockets into which spare spark plugs were screwed.

A fuse box with spare fuses, used in connection with a good conduit installation, is shown in one of the illustrations.

(Continued from page 20)

Why the 1924 Car Should Endure

effect in the production department. Balancing is confined to other parts, such as the flywheel, clutch members and even the fan. A combination balancing of all such units certainly will have its effect on the car's ability to stand up.

Alignment of Units

Another big item in connection with production is that of alignment of the units which make up the powerplant, and also other units such as the rear axle. In the case of a unit powerplant the clutch housing generally is bolted to the crankcase. Naturally there must be positive alignment between the engine and clutch and to secure this there is a growing tendency for the engine makers to wait until the main bearings are finished and then use these bearings as pilots for the tool which cuts the engaging surfaces on the crankcase and on the clutch housing. This affords positive alignment of the parts and is more accurate than using the flanges for location.

In the matter of alignment mention might also be made of the greater accuracy in finishing all housings, which consequently, makes for less variations in bearing mountings. Very often a good bearing is ruined because of poor alignment and inaccuracy of the unit in which it is mounted. A small degree of misalignment of the supporting members for the gears and bearings in a rear axle is sufficient to cause noise, rapid wear and ultimate failure of the parts. Bearings require great accuracy in their manufacture, but all this is soon nullified if the installation is not proper.

So, when it comes to making up the housings and bearing mounts in them we find that some makers are using grinding operations on the bearing seats, which formerly were made by reaming. Very close limits are allowed on the grinding operation at these points and the result is when the unit is assembled and put into service there is vastly more chance of such a unit standing up than would be the case if the parts were poorly made and assembled.

It would be possible to go through the entire structure of the motor car of to-day and trace the progress in design material and production and point out details to convince that to-day's cars have everything in their favor when the trio of customer, dealer and service man ask the universal question "Will the car stand up?"

Lighter Aircraft Engines Through New Alloys

THE construction of an airplane motor lighter in weight than the present types, and reputed to be more efficient, will be made possible through developments in the use of new alloys discovered by the engineering division of the U. S. Air Service. Two outstanding features of this new departure in motor construction, the War Department announces are: (1) Use of a magnesium combination which saves 200 pounds in the casting of a crankcase for an ordinary "W" type motor; and (2) a light nickel and copper alloy which produces parts twice as strong as the material now in use and considered standard.

The adaptation of the magnesium alloy is credited to the engineers of the service at McCook Field, Dayton, Ohio, and was reached after several years of experimentation, the Department announces. The formula consists of 93 per cent magnesium, 5 per cent aluminum and 2 per cent zinc. The metal now in use in motor construction consists of 92 per cent aluminum and 8 per cent copper.

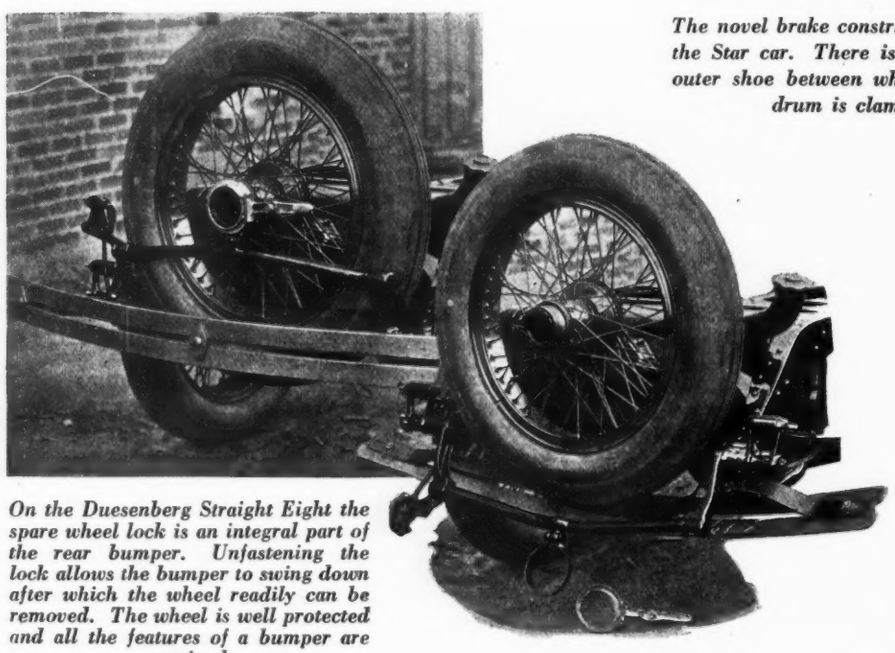
The second product consists of portions of aluminum, copper, nickel and magnesium. The formula has been known in metallurgy circles for some time, but the alloy was carried to a high state of perfection by means of a heat-treating process worked out at the station. One of the features of the alloy, it is said, is that it retains its strength at high altitudes where parts made of other metals weaken under similar conditions. It is used principally in the manufacture of cylinders on air-cooled motors, pistons, manifolds and cylinder heads.

Some Unusual Features to Help Sell the 1924 Motor Car

WHILE in a general sense the modern motor cars are fairly well standardized, there are numerous constructions which are found in only one make of car, and thereby distinguish such a car.

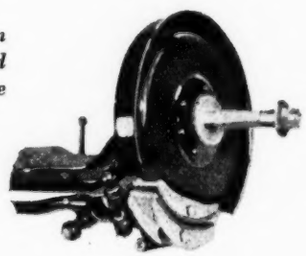
The following four pages of unusual designs and constructions have been selected in the belief that they will be of interest to the readers of MOTOR AGE. The items have been selected chiefly because they are not freakish in any sense of the word. The constructions in some instances make it easier for the car owner to perform certain adjustments. Others make for safety. Still others are of benefit to the maintenance man and the mechanic who are called upon to repair motor vehicles.

Some of the things we show because they are unusual in low price cars. Altogether the items on these pages, we believe, will carry out our prediction that the 1924 cars will stand up in service better than their predecessors.

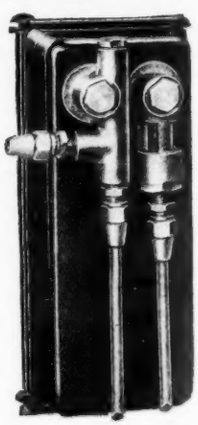


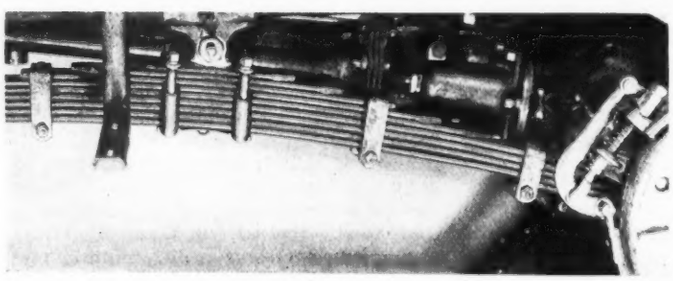
On the Duesenberg Straight Eight the spare wheel lock is an integral part of the rear bumper. Unfastening the lock allows the bumper to swing down after which the wheel readily can be removed. The wheel is well protected and all the features of a bumper are retained

The novel brake construction used on the Star car. There is an inner and outer shoe between which the brake drum is clamped

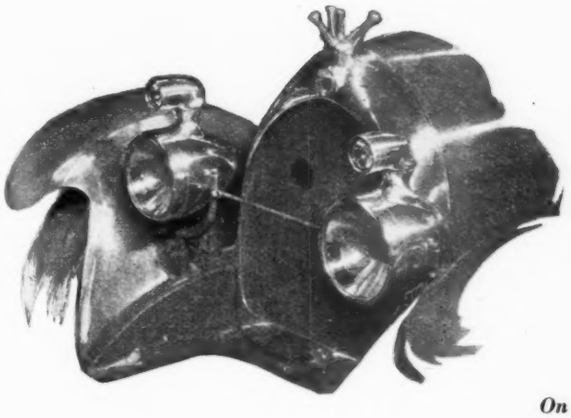


The oil purifier which is one of the features of the new Chrysler. It is designed to remove from the crankcase oil all solid contaminations as well as water

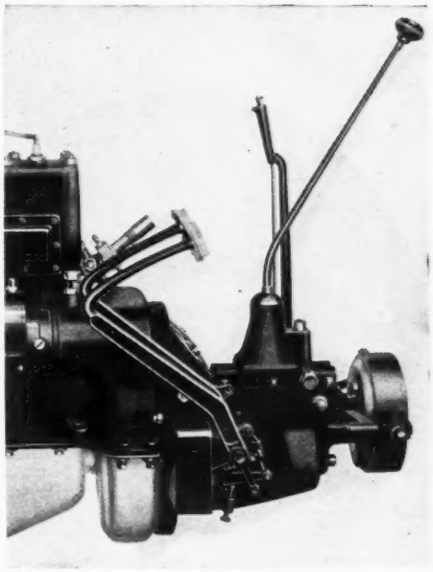




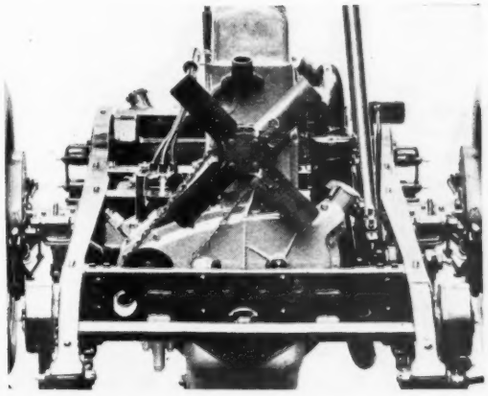
On the Dort car there is a small leaf under the rear springs which supports the main leaf where the latter is fastened to the axle. The feature of this leaf is the fastening of its front end to the clip, shown just ahead of the brake arm. Heretofore it has been customary on some cars using cantilever springs to leave this front end unfastened



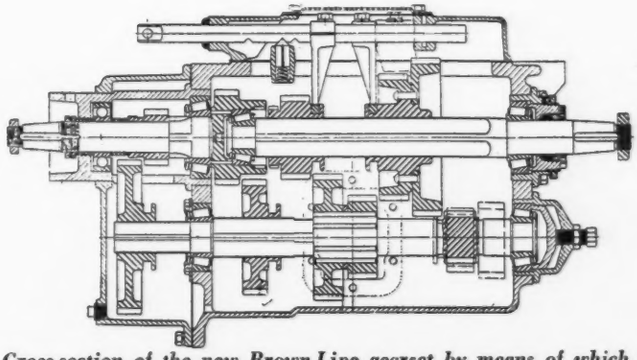
At the left is shown the dirigible lights on the Revere. By means of a lever on the instrument board the lights can be turned in any direction owing to their swivel mounting. This is especially valuable in turning corners at night, or for spotting road signs



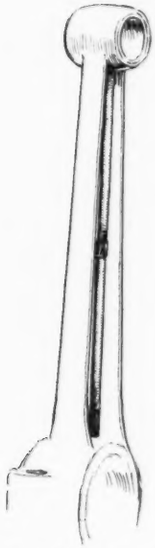
On the Chrysler Six there is a banjo type cross member to which the engine is bolted on one side and the gearset on the other. This makes it possible to remove either the engine or gearset without interfering with the other units



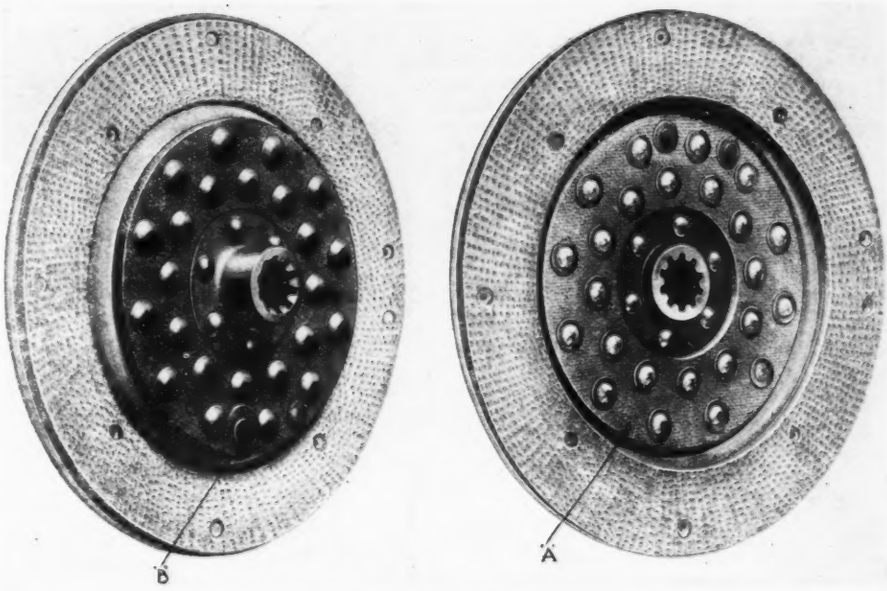
On the new Stutz the front frame cross member is removable. It is bolted to the side members. This naturally makes for better accessibility in case the powerplant must be removed



Cross-section of the new Brown-Lipe gearset by means of which it is possible to obtain seven forward speeds and two reverse. There are no gears which remain constantly in mesh

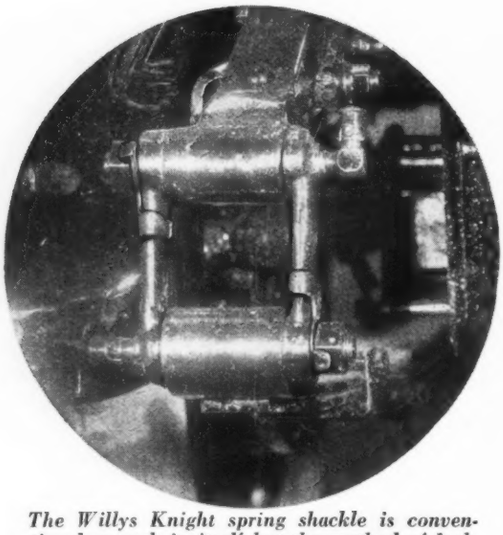


The connecting rod in the Velie carries an oil tube in the web of the rod to take the oil from the main bearing to the piston pin bearings. This is unusual in a moderately priced car

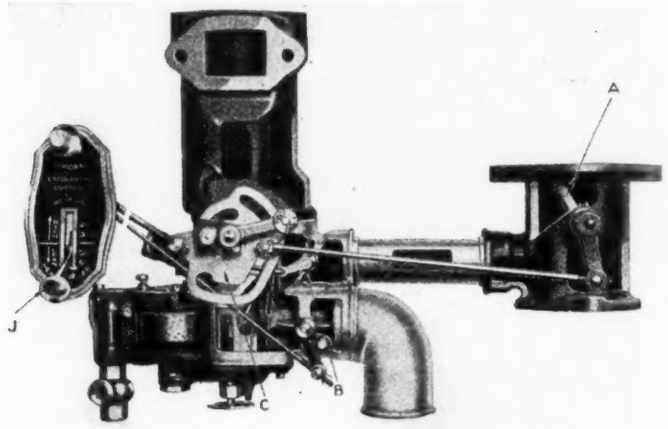


The vibration dampener on the Franklin. These disks act as a cushion between the engine and transmission driving gear. A is a rubber mat and B, a weight, for balancing purposes

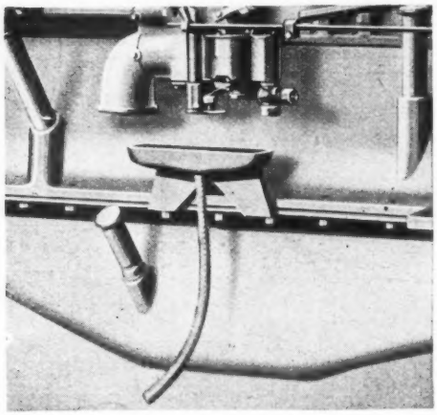
Unusual Designs and Constructions Are Revealed by



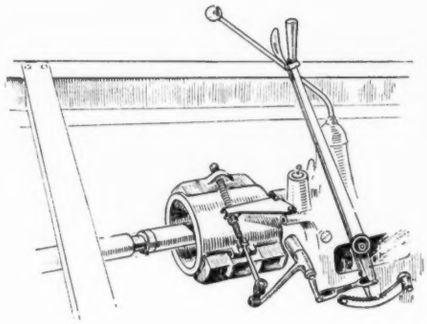
The Willys Knight spring shackle is conventional enough in itself but the method of locking the shackle bolt nuts is new. These locks operate on the principle of the star shakeproof locking washers



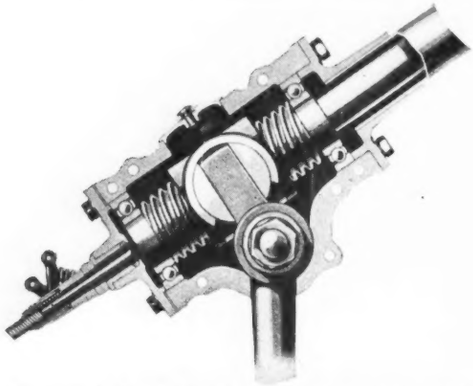
On the new Buick sixes the amount of heat delivered to the carbureter hot spot is controlled by throttle movement. The box cam is interconnected with the throttle linkage and heat is metered according to butterfly opening in carbureter. In addition to this a separate control on the instrument board is connected to the hot spot. This separate control is used to limit the automatic control



The safety drain at the bottom of the Buick carbureter is intended to lessen the chances of fire in the engine compartment. A leaking carbureter which otherwise would deposit the leaking fuel in engine pan is made harmless from a fire standpoint. Devices similar to this and a hand fire extinguisher should be standard equipment on every car



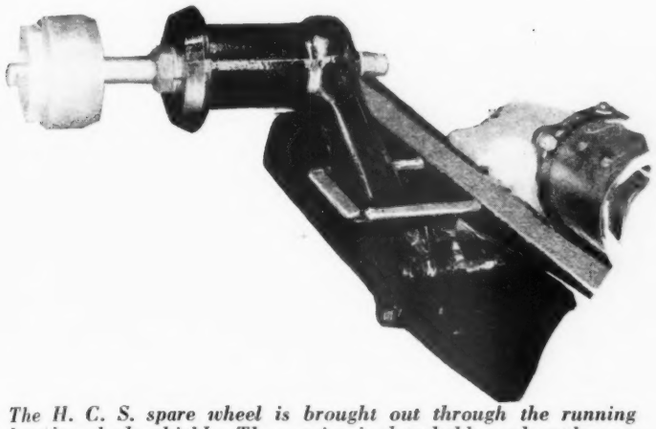
Good heat dissipation is claimed for this Wills Sainte Claire transmission brake. The metal blocks are ribbed for stiffness and heat radiation. The arrangement of the operating linkage does not show the block supports which are used to prevent chatter



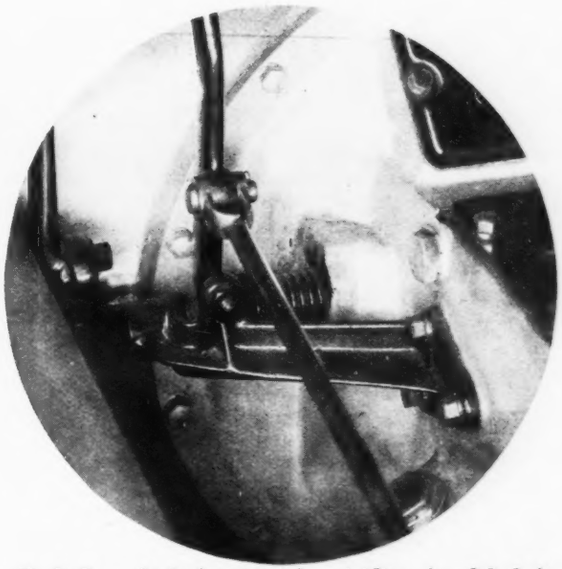
The feature of this Packard steering gear is the babbitt nut for the screw which is cast solid. It is claimed that the babbitt nut thus cast not only costs less but actually gives longer life than a nut of harder metal

Continuity of body lines has been secured in the new Elgin by building the trunk as a continuation of the rear body panel. The effect on the eye is obvious

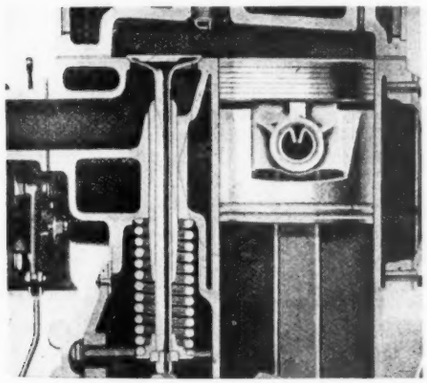
a Close Inspection of the 1924 American Chassis



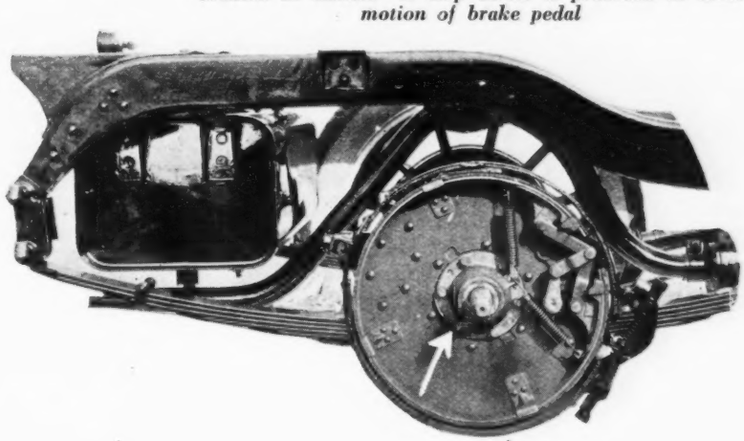
The H. C. S. spare wheel is brought out through the running board to body shield. The carrier is detachable and rattles are prevented by the introduction of non squeak lining on that part of the carrier in contact with the shield

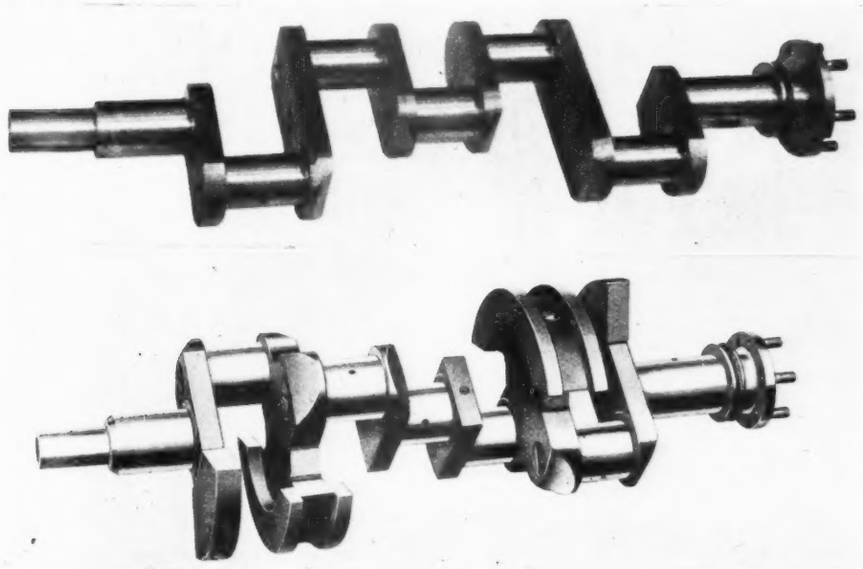


H. C. S. method of maintaining rigidity of pedal shafts. The strain usually imposed on the case bearing is taken care of by a form of outboard support formed by the bracket as shown. A stop screw is provided to limit motion of brake pedal

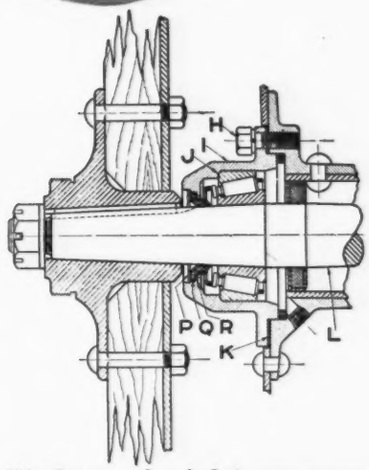


This cutaway view of the Packard single six illustrates two features of this engine. The liberal water passages show a valve that is well cooled. The first impression of the piston is that it is a light alloy split skirt type. In reality the piston is of iron provided with the relief and head insulation usually associated with the light alloy types. Note the method of retaining the piston pin





Old and new style Cadillac crankshafts. The throws on the old shaft are at 180 degrees and in two planes. The new shaft has throws in four planes each throw being at 90 degrees to the one adjacent. The weights are so located that the unbalanced masses are neutralized



Kissel rear axle of their own manufacture. Construction is featured by the method of adjustment of the axle tube outer bearings. Instead of the conventional threaded tube and nut, Kissel makes use of shims of varying thickness. Removal of the cap at end of axle tube gives access to these and by the selection of shims of the correct thickness the bearings are adjusted to desirable tension

Refinement of Detail Marks 1924 Model Bodies

Tendency Towards Low Priced Enclosed Vehicles Continues. Visors Given More Attention. No Real Attempt Made Towards Improving the Rear End of Cars

THERE has not been any radical departure in body designs over the ones brought out last year. There are details of refinements, of course, and the tendency toward the low priced closed model continues.

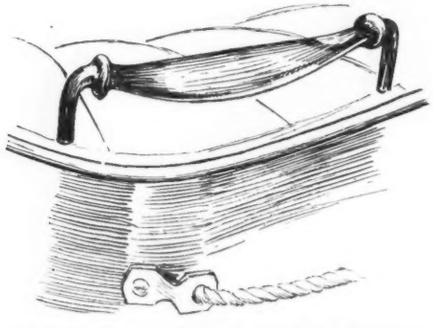
Bright finishes are just as much in evidence this year as last, but those car makers which sold some of their models last year with the dull finish continue and there is talk of several additional concerns furnishing the dull finish as optional.

In speaking of the upholstery material for closed cars, there is a strong leaning toward woolen fabrics instead of mohairs and velours. Pleated upholstery for open models is still the prevailing practice. Leather is not used very much these days for upholstering enclosed cars, except in the case of what is commonly known as the "business coupe."

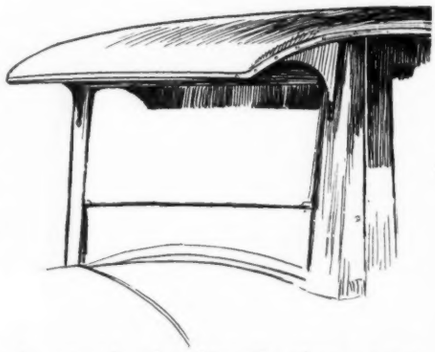
There has been a noticeable trend for mounting trunks at the rear of the body, on both open and closed models, but little has been done to make the trunk or trunk space an integral part of the body. Two examples, however, of where this has been done are found in the new Elgin and R. & V. Knight cars.

While there has been a marked tendency towards the refinement of detail on closed car bodies, little has as yet been done toward eliminating the unsightly and projecting door hinge. Naturally with the plain type of hinge it is necessary that the pins of these hinges be in a straight line. This means that on bodies which have a decided flare the bottom hinge will project a considerable distance, depending upon the amount of flare or insweep of the body.

On the inclosed bodies of the Cadillac an attempt has been made to get a clean exterior by doing away with the projecting hinges and substituting in their place hinges of the concealed type. On the Cadillac doors only one hinge is visible



Little things which help. In the Kissel, for example, a handle as shown is placed on each side of the front seat back to help the passengers in entering and leaving the rear compartment



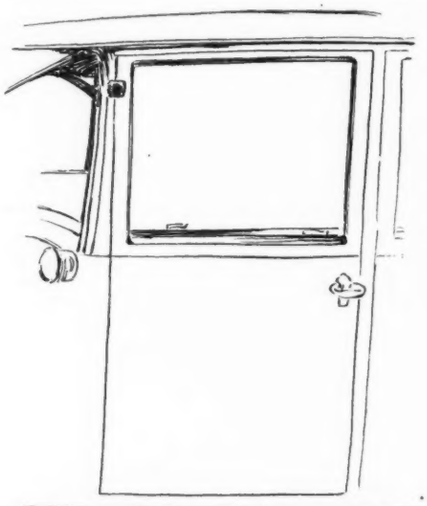
An example of making the visor a permanent member of the body. This is the construction as used on the Apperson. In the case of the Nash a similar construction is used and the drip edge extends all around the visor

at the top of the front door and only one at the bottom of the rear door, speaking now of the sedan. These hinges incidently are very small and not readily detected by the eye.

Good Example of Installation

With the invisible hinges it is of course, necessary also to have the pins centered and in obtaining this the doors open on a slight slant. However, in the case of the front door the rear topmost part is higher than the forward part and when the door is opened it assumes a horizontal position so far as the top door line is concerned.

Where the hinges project considerably no attempt has been made to make them decorative in any way, if indeed, that is possible. Of course, the invisible hinge



A good instance of where the hinges on the body are concealed is found in the Cadillac sedan. Excepting for the small hinge at the top no others are visible

means mortising the pillar and generally requires a more careful fitting of the hinge. The hinge generally used requires only a rabbet in the pillar and door the thickness of the hinge when folded. Some of the cheaper small cars are the most flagrant violators on the question of hinge appearance. Naturally the item of expense comes in here.

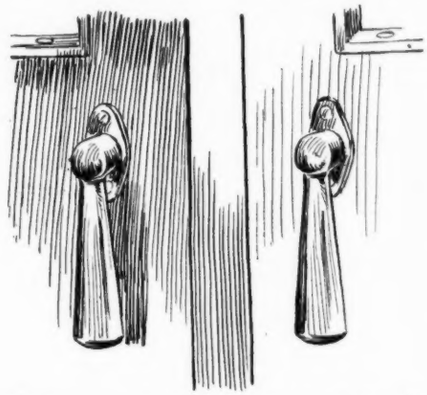
Some of the projecting hinges are so placed that they are not quite so conspicuous. On doors, for example, which are hinged at the front pillar of a closed body and where a tire is carried at the side, they are almost completely hidden from view. These instances are quite rare, however.

In connection with door hardware, several makers are fitting door handles which when the doors are closed assume a vertical position. The handles are not in the form of a T-type handle, but rather like the shape of the letter L. These handles look neat and are not so apt to catch a person's clothes.

One of the things which has added to the attractiveness of the cars is the method adopted by many makers to advertise the name of the car on the spare tire cover. Instead of the large letters formerly painted on the cover, the monogram of the car is painted in colors on a separate piece of material held under a celluloid cover and the whole neatly sewed to the cover. On the more somber colored cars and even on the brighter models this has the effect of offering a little spot of color which adds a distinctive touch.

Tendency for Permanent Visors

Even the casual observer must notice the tendency at present to equip closed cars with visors of the permanent type. When the visor first came into use it invariably was simply a case of attaching



There seems to be some favor shown the L-type of door handle. These look neat and are easy to operate as they are much more readily grasped in the hand than the T-type

the visor the same as was done with any other accessory. These visors were of the adjustable type, but the strange part of it all is that hardly a car owner ever took advantage of this adjustability feature. Once installed, the visor was kept at the same position.

This has had the effect of body builders building in visors of the permanent type. Even in these, the visor does not always have the appearance of permanency, although the angle of it cannot be changed. Such visors have the appearance of being attached after the body is built.

The real appearance of permanency so far as the visor is concerned is well illustrated in the Nash. Here the visor is covered with the same piece of material which covers the top and the drip edge of the top is carried around on the sides of the visor.

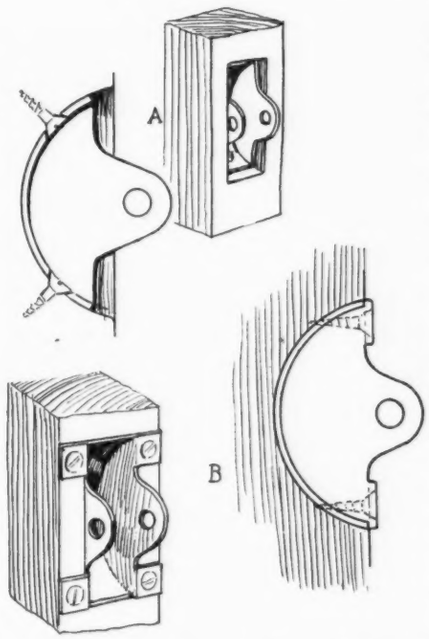
Some of the cars which formerly were fitted with visors supported by brackets which left a small open triangular space at each end now cover this opening. This makes the whole visor appear more massive without actually adding weight. Usually these coverings are of metal, although in some cases fabric is used to match the visor and top.

Hardware Installation

Criticism might be directed at the methods used by some body builders when it comes to installing some of the body hardware, such as the anchoring of the fitting which supports the movable arm in the crank type of window regulator.

As may be generally known window regulators of this type depend upon a spring to balance the weight of the window and, therefore, make it easier for the operator to manipulate the window. The fact that the window must drop into the door makes it necessary that there be ample clearance within the door frame. This means that some of the window operating mechanism must be set into mortises cut in the door posts.

The result is that the screws which are depended upon to hold such fittings in place do not get sufficient "bite" and often are pulled out because of the constant tension of the strong spring. As an example, the screws which in some installations hold the support for the movable arm in place are so placed that short screws must be used and these are driven virtually into the end grain of the wood. Every woodworker knows that screws under such conditions do not hold. A suggested form of installing this fitting is shown herewith, which makes it just as easy to install the screws with the additional advantage that the screws are driven into the grain of the wood as they should be.



At the top, A, is shown the more or less conventional practice in the mounting of window operating lever brackets. The screws are short and pull out easily. A suggested construction for the bracket is shown at B. Here the screws are longer and driven into the grain of wood properly

Improving Looks of Rear End

Mention might be made here of the fact that there has not been the same amount of attention given toward beautifying the rear end of the car, as is the case with the front end. A glance at the front end of most any car of today will show a vast improvement over former days. Radiators are narrower and higher and more beautiful in contour; lamps are neater and better mounted; splash aprons, hoods, and so on, all have been improved in looks. But if we glance at the rear end of most cars of today and compare them with cars of former days, they look very much the same. There is not quite as much to work with in the rear of a car, but we believe, that a little thought in the direction of bettering the appearance of car's rear will be worth while. Especially is this so when we consider that the rear end of a car is probably looked at much more than the front end, particularly in trailing a car on a crowded thoroughfare . It is worth considering.

Facts About One Wonder Battery Solution

THERE is a constant stream of inquiries about the wonderful battery solutions that are so heavily advertised to shop owners as well as motor vehicle owners and our disapproval of these is often questioned. The fact that these solutions are never sold in connection with a reliable battery should be a sufficient warning. In these competitive days, every battery maker is anxious to improve his service to the car owner and certainly anything that was a big step in advance would be quickly seized upon by the big companies. Now comes a definite report on another of these solutions:

An analysis of "Lightning" has been made by the National Vigilance Committee of the Associated Advertising Clubs of the World, from samples obtained on the open market, and this solution has been found to contain substantially, Sulphuric acid, Epsom sales and Glauber salts. Also Litmus to give it color and sufficient oil of Mirbane or other similar ingredient to give it odor.

As the chief advertising statement used was to the effect that this solution charged the battery instantly a test was made to ascertain this point. A fully charged battery was subjected to the standard S. A. E. test in which it was discharged at the 5 ampere rate until the voltage had dropped to 1.8 volts per cell. The solution was then dumped, "Lightning" put in and the battery allowed to stand 30 minutes.

Upon resuming the discharge nothing but a small amount of residual energy could have been present in the battery, for in a short time the lights on the resistance bank faded away, the voltage dropped to a mere trace and the polarity of the middle cell reversed; the battery was completely exhausted.

The only way that a battery may appear to get additional life by the dumping of an old solution and the use of another one, is by having the new solution stronger in acid content than the one that is dumped. The stronger acid attacks the grid structure, eats it away and gives some additional energy at the expense of the battery life.

The only real way to charge a battery is to run a direct current of electricity through it.

In the investigation made the conclusions drawn were to the effect that the advertising claims were generally unwarranted. The solution was supposed to prevent sulphation, whereas it would tend to produce it. It was said to prevent overheating, whereas it was the opinion of the committee that it would indirectly produce overheating, due to the battery user figuring he had a well charged battery, and trying to use the current accordingly.

While more might be said, we feel that it has been so well said in the bulletin, that it would be well for those deeply interested in the subject to get a copy of the Nov. 21, 1923 bulletin from the Associated Advertising Clubs of the World, 383 Madison Ave., New York City.

STUDENTS USE CARS FOR NATURE STUDY

INCREASING use of motor transportation for educational purposes is reported in The Reader's Digest which states that buses are used by the School of Education in Cleveland for the classes in geography and nature study. The same item reports that the class in biology at Oberlin College crosses every summer to the Pacific Coast. Students use their own cars and make use of the motor camp sites along the way.

A Few Hints on Magnet Charging

It's Important to Know the Right Way. The Wrong Way May Make the Magnet Weaker

By A. H. PACKER

IN the electrical shop which does any considerable amount of work on magnetos it is quite essential to have a magnet charger, the usual type being shown in Fig 1. Unless the man who is working on magnetos has had considerable experience however, he may not know what is the best way of recharging the magnets even after a charger is available.

The first question that comes up is "Which way should I put it on?"

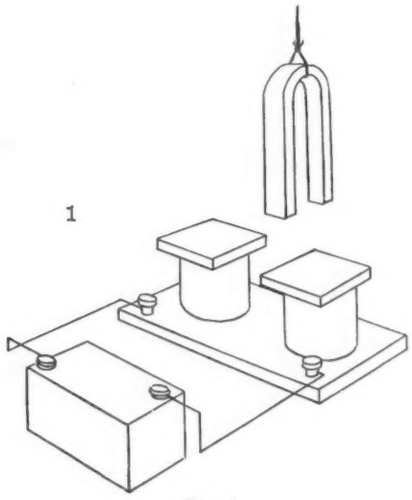


Fig. 1
Suspending magnet over charger to get it on the right way

The correct way is to have a north pole and a south pole together but in most cases the magnet is not marked and it is not easy to tell which pole of the electro magnet is the north pole. We can however, depend on the rule that unlike poles attract each other and if the magnet is suspended on a piece of string as shown in Fig 1 and then lowered it will take its correct position. As the magnet is lowered it will swing around from the position shown and will always go on the right way. It is of course necessary to have the battery connected up before doing this.

The next step is to put the magnet in place and pull it off as shown in Fig. 2. The position the magnet takes in as shown the keeper may be removed Fig 2 is the way it is dropped onto the magnet charger and it should always be pulled off as shown by the arrow. If pulled off in the other direction the magnet will be weakened instead of strengthened.

After the magnet has been dropped on and pulled off a number of times it should be dropped on and pulled nearly off but still be left with the ends in contact with the magnet charger as shown

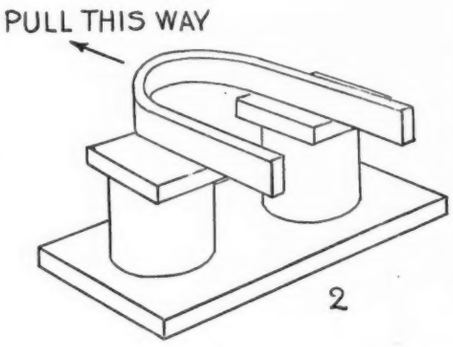


Fig. 2
Dropping magnet in place in process of magnetizing it

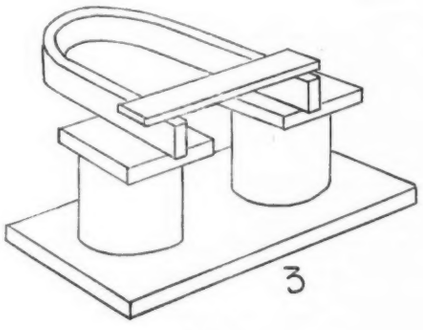


Fig. 3
Put keeper in place before magnet is taken from charger

in Fig. 3. A keeper, as indicated in Fig. 3, should now be placed at the lower portion of the magnet and should be left on while the magnet is moved to the magneto which is shown in Fig. 4.

After the magnet has been placed on this is done they will all go on the same way so that all of the north poles will be on the same side of the magneto. This will give satisfactory operation on all magnetos except the Duplex type. On the Duplex type magneto, of which the magneto and the armature is in place but should not be pulled up toward the top of the magnet or it will have some effect in weakening the magnet. The armature being in the magneto when the magnet is applied, serves as a keeper so that the magnet is never without a keeper from the time it has been charged until it is in place on the magneto.

All of the magnets should be transferred from the magnetizer to the magneto without turning them around. If

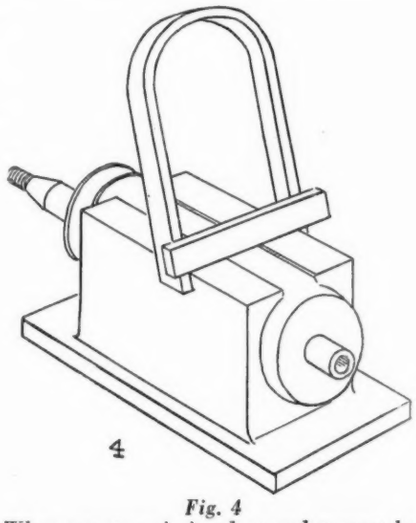


Fig. 4
When armature is in place and magnet has been applied keeper may be removed.

the Simms Huff on 1916 Maxwell cars and the Bosch on 1914 Packard cars were examples, it is desirable to have the north poles on a certain side of the magneto. However, if all of the magnets are reversed and it is found that the magneto does not give a spark in the battery position of the switch, it is only necessary to reverse the two wires at the interrupter cover of the magneto in order to compensate for the reversal of the magnets.

Hupmobile "Firefly" Seen in Boston Skies

CHARLES T. JEFFREY, of the Jeffrey-Nichols Company, New England distributors of the Hupmobile, started this week showing the people of Boston and surrounding places how to advertise his car after nightfall. For the past few nights people have been craning their necks as they saw what seemed to be a giant firefly darting along through the sky. As it circled above them the people could read "Hupmobile."

Jeffrey owns three aeroplanes, and he has won some valuable cups in competition. So he decided to use them for additional benefits to market his car. By placing 20 large electric bulbs around the wings and painting "Hupmobile" on the wings underneath it is an easy matter when the plane is flying at night to read the word. And the circling light against the blackness of the sky makes it all the more prominent. The plane is used by day also and the name may be read without glasses.

Mechanical Specifications of American Automobiles, Trucks, Tractors and Motor Buses in Use Today

IN THE following pages MOTOR AGE presents to readers the mechanical specifications of the American motor cars, trucks, tractors, motor buses and electric vehicles. The collection of specifications is a word picture of what the automotive industry affords at the present time. We believe this group of specifications, serial numbers and other data will be of vast use to the dealer as regards both his sales and service.

The specifications are of value to the dealer because in no other way, so far as we know, is he able to get as comprehensive and complete data with the assurance that it is authentic and accurate. This issue of MOTOR AGE should be regarded by the dealer as a reference book. He will refer to it many times, as will also his salesmen, shop foreman and mechanics.

To the dealer the specifications are of value because they tell him many things. They enable him to make comparisons, he can compile average figures from them and should he be seeking to make a change in the line he is handling, he can, by reference to the tables make a selection much more readily. He has prices and other factors to guide him. He may want to add to his present line and, therefore, can look over the lists of cars and make his selection to fit in to good advantage with his present line.

Thus, if he is handling a certain make of car and wishes to take on another car in a different price field he may make a selection of a car wherein some of the units are of the same make or even interchangeable with those of the other car. In this way his parts stock can be shaped more easily in that a smaller stock on certain units can be carried.

Salesmen will find the specifications of benefit because it enables them to talk with authority when it comes to a discussion as to whether or not this and that car have the same clutch, axle or electric system. The specifications enable the salesmen to correctly inform a prospect on any technical point which may arise. A close study of the following pages will suggest many uses for them to the new car and used car salesman. The used car salesman will find the serial numbers invaluable. They enable him to check the age of a car which is to be turned in on a new car sale.

To the maintenance man there are numerous ways to use the mechanical specifications. For instance, if there is a car in the shop requiring new clutch disks and the stock of disks is exhausted and glance at the specifications will show perhaps another make of car using the same clutch. The dealer's service department then can get into touch with the dealer in the vicinity handling this car and probably get the required disks.

Also, the tables are of value in that they specify the name of a unit and the model. This makes it possible for a mechanic to effect adjustments and repairs more easily. For example, if a car owner calls the service station and says he is stranded several miles out with his car, the mechanic, if he does not already know, can refer to the specifications of this car and note the make of ignition, carbureter, or whatever part his judgment tells him is out of adjustment. This enables him to take along the correct breaker points, carbureter jets, etc. And the owner will wonder how he knew what to bring.

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The specifications as herein presented afford a cross-section of the automotive industry, so far as the dealer is concerned. From them he can trace the trend of the industry, especially if he has preserved the specification sheets which have gone before.

In several instances where there is almost a one hundred per cent adoption by the makers of a certain unit or system, it has not been included in the tables. For example there are a half dozen or less cars not using the vacuum system of fuel feed. For the most part these cars are generally known to the trade and this item, therefore, has been omitted.

In a forthcoming issue MOTOR AGE will publish in its maintenance data sheets, some additional mechanical features of the 1924 cars, to supplement those on the following pages.

USING THE SPECIFICATIONS

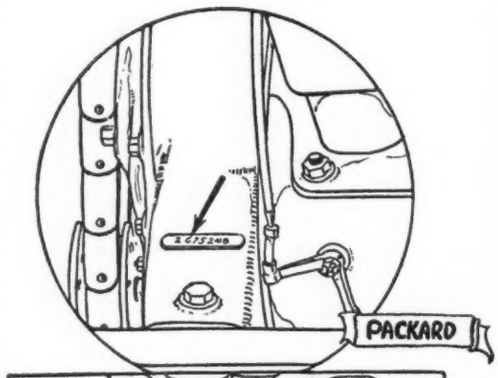
They are of vast help when a dealer wishes to select an additional make of car to handle.

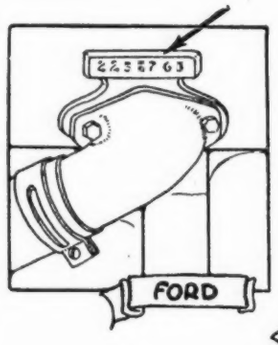
They enable a dealer to make comparisons with other cars in the same price class as the one he handles.

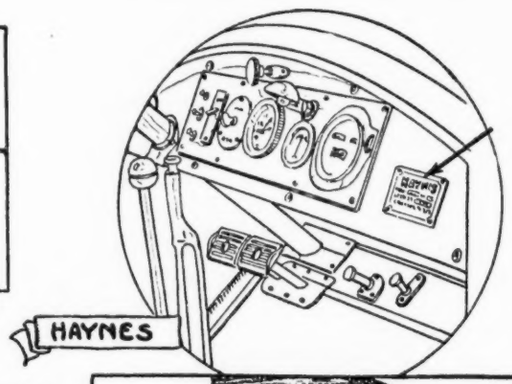
They enable salesmen to talk with authority to the prospect.

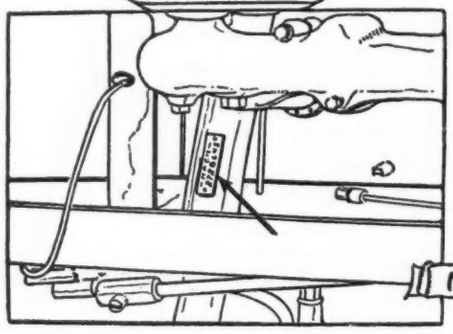
The serial numbers are of special assistance to the used car salesman or appraiser.

The maintenance man and mechanic will find the specifications of help in that they immediately tell him the make and model of units in any car.

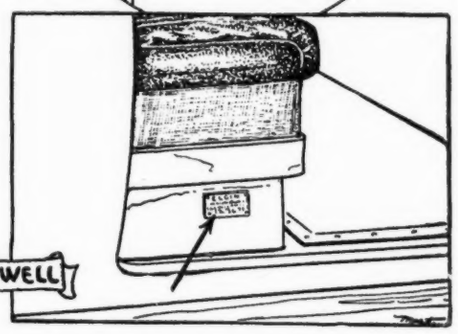








SERIAL numbers and engine numbers are not always located in the same place. Sometimes it is difficult, therefore, to locate the numbers readily. In order to make the job a little easier we are showing herewith some of the usual locations for the serial and engine numbers. Engine numbers often are located on the supporting arms, nameplates, etc. Serial numbers may be on the dash, seat support, etc. Only the numbers up to and including the 1920 cars are listed.



Motor Age Passenger Car Serial Numbers

NOTE:—Serial numbers for cars earlier than 1915 can be found in the 1923 Chicago Show Issue and specifications Number of Motor Age, published January 25, 1923.

ACE

Year	Model	Cyls.	Price	Serial Numbers
1920	L	6	$2260	1001 to 1556
1921	G & H	6	2975	
	L	6	2260	

Discontinued

ALLEN

Year	Model	Cyls.	Price	Serial Numbers
1915	34	4	$ 895	3499-5233
1916	37	4	795	6000-15631
1917	Classic	4	850	
1918	41	4	1095	18000-21000
1919	43	4	1395	

Number stamped on front motor cross member

1920	43	4	$1495	50001 and up

Number stamped on frame of right front spring hanger

1921	Series 43	4	$1385	

Discontinued

AMBASSADOR

Year	Model	Cyls.	Price	Serial Numbers
1922	R	6	$4500	4150-4164

Number on left front horn

AMERICAN

Year	Model	Cyls.	Price	Serial Numbers
1917	A	6	....	1-250
1918	B	6	$1375	251-1000
1919	B	6	1865	1894-2378
1920	B-6	6	1865	

Number on left side of motor
Number on inside of dash under hood, lefthand side

1921	C6	6	2275	3000-4000
1922	C	6	1850	

Number on plate under seat

ANDERSON

Year	Model	Cyls.	Price	Serial Numbers
1915	100-A	6	$1345	
1916	200-A	6	1435	
1917	300-A	6	1550	
1918	400-A	6	1435	
1919	Series 30	6	1850	
1920	Series 30	6	1850	
1920	30A-30G	6	1850	331-37272
1921	Series 40	6	1795	423-38129
1922	Series 40	6	1650	4155-42157

Numbers are arranged by body styles and do not run consecutively.
Number on plate under hood, right side dash

ARGONNE

Year	Model	Cyls.	Price	Serial Numbers
1919	....	4	$4750	....-110
1920	....	4	4750	2011 up

Discontinued

APPERSON

Year	Model	Cyls.	Price	Serial Numbers
1915	40	4	$1350	8500-10500
	45	6	1485	
1916	6-16	6	1550	10501-12000
				15000-16000
	8-16	8	1850	12001-13000
1917	6-17	6	1750	16001-17000
	8-17	8	2000	12000-13000
1918	6-18	6	....	17000 up
	8-18	8	2550	
1919	8-19	8	2800	
	Anvsy.	8	4000	18000-21000
1920	8-20	8	2950	
	Anvsy.	8	4000	

Number on right front engine leg

	8-20	8	3500	19000-21702
	Anvsy.	8	4250	
1921	8-21-S	8	3500	
1922	8-21-S	8	2620	25200-30000

Number on right front side of crankcase

AUSTIN

Year	Model	Cyls.	Price	Serial Numbers
1915-16	77	6	$6000	FO12-F1045
1916-17	66	6	3600	C1003-C2862
1918	12-Cyl.	12	3750	C1003-C2862

Discontinued
Number on instrument board

AUBURN

Year	Model	Cyls.	Price	Serial Numbers
1915	4-36	4	$1075	
	6-40	6	1500	
1916	6-38	6	1050	
	6-40A	6	1375	
	4-38	4	985	
1917	6-39	6	1145	
	6-44	6	1535	
1918	6-39-B	6	1345	
	6-44	6	1685	
1919	6-39H & 39K	6	1695	

Number on floor board in front under cowl

1920	6-39	6	$1795	22100 and up

Number on end of seat, left side. The serial numbers of this car do not run consecutively or by years.

1921	6-39	..	$1695	29725-33359
				33360-34116
1922	6-51	6	1575	33360-36999

Number on footboard in driver's compartment

BARLEY

Year	Model	Cyls.	Price	Serial Numbers
1922	6	6	$1395	35000-35211

Number near light bracket, right hand side rail

BEGGS

Year	Model	Cyls.	Price	Serial Numbers
1918	18-T	6	$1530	1018-1108
1919	19-T	6	1580	1019-11609

BEGGS—Continued

Year	Model	Cyls.	Price	Serial Numbers
1920	20-T	6	$1630	1020 and up
1921	20-T	6	1775	
1922	Production limited			

Number on front end of frame; engine number plate on left side of motor.

BIDDLE

Year	Model	Cyls.	Price	Serial Numbers
1915	C	4	$1700	C200-C299
			1700–	
1916	D	4	1850	D300
1917	D	4	2275	D
1918	H	4	2750	H100-H1099
1919	H	4	2985	H1100-H1179
1920	B-1	4	3950	2000 up
	B-5	4	....	1500 up

Number on dash; engine number on upper left front crankcase

	B-1	4	3950	2000 up
1921	B-1	4	3475	3000 up
1922	B-1 & B-5	4	2950	3500 up

Number on right side of dash

BIRCH

Year	Model	Cyls.	Price	Serial Numbers
1920	30-B	4	....	B-126 up
	40	4	....	42000 up
	45-B	6	....	N-151 up

Number on name plate on dash

1921	Super 4	4	$1345	
	Light 4	4	1195	
	Light 6	6	1595	

Discontinued

BOUR-DAVIS

Year	Model	Cyls.	Price	Serial Numbers
1916	17	6	$1250	1-267

Number on dash under hood; engine number on left side crankcase

1917	17-B	6	1500	1000-1022

Number on top of seat frame under cushion

1918	18-B	6	$1850	1100-1104
1919	....	..	....	1105-1134

Number on dash under hood. No record of 10 or 12 cars built by Shadburn Bros., Anderson, Ind.

	20	6	$1595	
1920	....	..	1700	1 up
			9-1-19	
1920	20	6	1825	1-200
	21	6	2585	2000-2096

Number on front seat base opposite left hand door; engine number on left side crankcase
Number on front seat near floor board

1921	21-S	6	$2385	

Discontinued

BRADLEY

Year	Model	Cyls.	Price	Serial Numbers
1920	H	4	....	1400 up

Number under front seat, on dash and on bottom of all doors
Discontinued

BREWSTER

Year	Model	Cyls.	Price	Serial Numbers
1915	41	4	....	41001-41242
1916	41	4	....	
1917	41	4	....	
1918	41	4	....	
1919	91	4	....	91242-91241
1920	41	4	$9000	41242-41341
1921	91	4	7000	
1922	91	4	5000	

Number on plate screwed on the motor side of dash
Serial numbers do not run in rotation

BRISCOE

Year	Model	Cyls.	Price	Serial Numbers
1916	4-38 & 8-38	4	....	5001-8751
	Number on front seat heel board			
	4-24	4	....	15001-18846
1917	4-24	4	....	18847-26604
1917-18	4-24	4	....	26605-34885
1919	4-24	4	....	34886-45786
1920	4-34	4	$1185	M-550-M-558
				50000-57500
1921	4-34	4	1085	57500 and up
1922	4-43	4	....	58588-58606

Number on dash plate
Name changed to Earl
Discontinued

BROOK

Year	Model	Cyls.	Price	Serial Numbers
1920	S-20	2	$395	1-1500
	Number on front of timing gear housing			
1921	S-21A	2	$395	

Discontinued

BUICK

Year	Model	Cyls.	Price	Serial Numbers
1914	B-24-25	4	$ 950	
			1050	
	B-36-37	4	1235	
			1335	
	B-55	6	1985	
1915	C-25-24	4	900	100000-144715
			950	
	C-36-37	4	1185	
			1235	
	C-54-55	6	1635	
			1650	
1916	D-44-45	6	985	
			1020	144717-254501
	D-54-55	6	1450	
			1485	
1917	D-44-45-46	6	1040	
			1070	
			1440	254502-343782
	D-34-35-37	4	660	
			675	
	E-49	6	1385	
1918	E-4-34-35	4	795	
	E-6-44	6	1265	
	E-6-45-46	6	1265	
			1695	343783-480995
	E-6-49-50	6	1495	
			2175	

Number on left front side of frame member; engine number on left side crankcase

1919	H-44-45	6	$1495	
	H-46-47	6	1985	
			2195	480996 up
	H-49-50	6	1785	
			2585	

Number on rear end of left frame member; engine number on left side crankcase

1920	K-44-50	6	$1495	547524-689794
1921	44-7	6	1525	
	48-50	6	1735	
1922	34-37	4	935	
1922	44-47	6	1395	
1922	48-50	6	1785	

Number on left frame at rear
Numbers run according to body style

CADILLAC

Year	Model	Cyls.	Price	Serial Numbers
1912	1912	4	$1800	61006-75000
1913	1913	4	1975	75001-90018
1914	1914	4	1975	91005-99999
				A1-A5008
1915	Type 51	8	1975	A6000-A19001
1916	Type 53	8	2080	A20000-A38003
1917	Type 55	8	2080	
	before Dec. 14, 1917			55-A1-55-S2
			$2240	
	after Dec. 14, 1917			
1918-19	Type 57	8	$3220	57-A1-57-1000-57-TT-146
1920	Type 59	8	3490	59-A-1

Number on left front of engine in four-cylinder models. Number back of the right cylinder block on eights. For 1917 and 191^ the figures in front of letter indicate type of car the number following letter the number of engine for that particular letter. There are 1000 numbers for each letter of the alphabet

1920	59-A	8	$3490	59-A-1 to 59-V-636
1921	59	8	3490	59-A-1 to 61-A-1
1922	61	8	3150	61-F-25-61-Z-3500

Number stamped on the right rear corner of crank case at the rear of the right cylinder block.

CAMPBELL

Year	Model	Cyls.	Price	Serial Numbers
1918	....	4	$ 835	1-537
1919	C-4	4	1000	538 up

Number plate on left side of dash under hood
Discontinued

CARROLL

Year	Model	Cyls.	Price	Serial Numbers
1920	C	6	....	321-1 to 321-105
1921	C	6	$3985	
	D	6	3185	

Serial number on dash
Discontinued

CASE

Year	Model	Cyls.	Price	Serial Numbers
1915	R	4	$1350	26334-28340
1916	T	4	1190	28341-31350
1917	T-17	4	1190	31351-32354
1918	U-18	6	1875	32355-34856
	U-19		2100	
1920	V	6	2650	34860 to 37287
1921	V	6	2650	37780-38744
1922	W	6	2200	43751-44035
	X	6	1790	38755-40017

Number on dash and in front cross bar of frame

CHALMERS

Year	Model	Cyls.	Price	Serial Numbers
1915	26-A	6	$1800	
	26-B	6	1850	
	Aug. 1, 1914		1700	38600-44999
	Sept. 1, 1914		1650	
	26-C	6	1550	45000-45799
	29	6	2400	45801-47300
	June 1, 1915		2175	

Numbers from here on are by models and not by year

	32-A	6	$1400	47500-49599
	July 1, 1915		1275	
	32-B	6	1350	
	Aug. 1, 1915		1450	50600-56999
	April 1, 1916		1350	
	35-A	6	1050	55700-75699
	April 20, 1916		1090	
	35-B	6	1280	
	Jan. 1, 1917		1350	
	Nov. 1, 1917		1450	75700-82000
	Nov. 24, 1917		1535	
	April 8, 1918		1615	
	35-B	6	1765	
	July 12, 1919		1765	82000 up
	35-C	6	1250	
	Nov. 1, 1917		1365	
	Nov. 24, 1917		1485	94001 up
	April 8, 1918		1565	
	July 12, 1919		1685	

Number on 1915-16 models on left frame member under front boards. Number on 1916-17-18-19 models on left front horn of frame.

1920	Roadster	6	$1795	94001 to 110000
				111101 to 112000
	5-Passenger	6	1795	115001 to 200000
	7-Passenger	6	1945	200001 and up
	Sport	6	1995	115001 to 200000
	Coupe	6	2595	115001 to 200000
	Sedan	6	2745	111101 to 112000
				114001 to 114101
1921	6-30	6	1545	200000 up

Number on brass plate on left horn of frame just in front of radiator.

1922	35-B	6	3395	225001-225203
				125509-129332
	35-C	6	1495	130001-131308
				131502-131505

Number on right frame rail, in front of dash

CHAMPION (Formerly Direct Drive)

Year	Model	Cyls.	Price	Serial Numbers
1918	....	4	....	101-113 demonstrating models only
1919	C & C8	4	$1150	C-100—C-216
1920	C-4	4	....	C-300 up

Number plate on body under seat.

1920	Touring	4	$1350	100 to 299
1921	Tourist	4	1250	C200—C299
	Special	4	1595	CS200—CS299

Number on inside dash on instrument board.

1922	Production Limited			

CHANDLER

Year	Model	Cyls.	Price	Serial Numbers
1913	14	6	$1785	1-550
1914	15	6	1785	551-250
1915	15-B	6	1295	2501-4000
1916	16	6	1295	4001-15000
1917	17	6	1295	15001-35000
1918	New Series	6	....	35001-65000
1919	New Series	6	....	65001 up
1920	New Series	6	1895	

Number on right front engine arm up to car number 72000; cars numbered above 72000 the number is on frame under right headlight and fender.

1921	6	6	$1785	

Chandler cars are not listed by serial numbers for each year, but are classed as new series of the current model.

1922	6	6	$1595	115001-1263000

Number stamped on right hand frame rail behind front fender iron.

CHEVROLET

Year	Model	Cyls.	Price	Serial Numbers
1915	H-2	4	$ 750	
	H-4	4	875	
	L	6	1425	
1916	490	4	490	
	H-4	4	750	

CHEVROLET—Continued

Year	Model	Cyls.	Price	Serial Numbers
1917	490	4	$ 490	
	F-5	4	800	
	D-5	8	1385	
1918	490	4	635	
	FA-5	4	935	
	D-4	8	1385	
	D-5	8	1385	
1919	FA-5	4	1045	
	D-4	8	1385	
	D-5	8	1385	
	FB-5	4	1135	
	490	4	735	
1920	FB-50	4	1135	
	490	4	735	
	T	4	1460	1-2284 to 1-4199
				2-2202 to 2-36617
				3-1301 to 3-1952
				6-1645 to 6-2362
				9-356 to 9-847
	FB Touring	4	1295	1-9385 to 1-20516
	FB Roadster	4	1270	2-4739 to 2-11448
	FB Sedan and Coupe	4	1855	3-54 to 3-1500
				6-1290 to 6-4990
				9-1336 to 9-4604
	490 Roadster	4	775	1-92475 to 1-A-20160
	490 Touring	4	795	2-90422 to 2-A-23673
	490 Coupe	4	1170	3-47101 to 3-70100
	490 Sedan	4	1245	6-36885 to 6-51094
				7-25430 to 7-34200
				9-28154 to 9-40225
1921	490	4	645	
	FB	4	1185	
1922	490	4	525	59934-101981
	FB	4	975	2253-39556

Number on plate under instrument board on dash

As Chevrolet cars are numbered by manufacturing zones it is not possible to reproduce the numbers in such a way as to be of use to the dealer. In case of doubt write the Chevrolet Motor Co., 1764 Broadway, New York City.
Number on dash.

NOTE.—The numbers 1-2-3-6-7-9 before the serial numbers indicate the plant from which the car was made. No. 1 Plant, Flint; No. 2 Plant, New York and Tarrytown; No. 3 Plant, St. Louis; No. 6 Plant, Oakland; No. 7 Plant, Fort Worth; No. 9 Plant, Oshawa.

CLEVELAND

Year	Model	Cyls.	Price	Serial Numbers
1919	40	6	$1385	1001 up
1920	40 Touring	6	1385	3485 and up
	40 Roadster	6	....	3490 and up
	40 Sedan	6	....	3914 and up
	40 Coupe	6	....	1398 and up
	40 Chassis	6	....	4174 and up
1921	40	6	1295	21190-25000
1922	41	6	1195	25000-40000

Number plate on right hand frame members about 12 inches from frame; engine number front of crankcase under oil filler.

CLIMBER

Year	Model	Cyls.	Price	Serial Numbers
1920	T	4	$1465	213 to 320
	S	6	2395	1001 to 1112
	Number on left front frame.			
1921	4	4	$1385	T100—T390
	6	6	2250	S1000—S1400

Number on left front frame horn and also on motor

1922	Production limited.			

CRAWFORD

Year	Model	Cyls.	Price	Serial Numbers
1915	15-6-35	6	$1850	
	15-40	..	2100	988-1090
1916	16-40	6	1650	1091-1195
1917	17-40	6	1750	1196-1234
1918	18-40	6	2250	1235-1294
1919	19-6-40	6	2500	1295-1337
1920	20-6-40	6	3000	1338 to 1650
1921	6-40	6	3000	
	Number on seat next to door.			
1922	22-6-70	6	3000	1485-1570

Number on floor boards under cowl.

COLE

Year	Model	Cyls.	Price	Serial Numbers
1915	660	6	....	15000-15175
	666	6	....	15175-16000
	Series 10	4	....	18000-20000
	Series 10 Little 6	6	....	20000-22000
	440	4	....	22000-23000
	650, Sensible 6	6	....	23000-24000
	651, Little 6	6	....	24000-25000
	850	8	....	27000-30000
1916	666, Big 6	6	....	15175-16000
	860, Series 30	8	....	30000-40000
1917	860, Series 40	8	....	40000-50000
1918	870	8	....	50000-59478
1919				
1920	870	8	....	59389 up
	870	8	$3250	
	871	8	3250	
	872	8	3250	
	878	8	4350	59000 approximate to
	879	8	4450	65000 approximate
	883	8	4250	
	884	8	4450	
	885	8	4450	
1921	890	8	3250	
1922	890	8	2485	66875-68644

Number on right front spring hanger and under right front seat cushion.

COLUMBIA

Year	Model	Cyls.	Price	Serial Numbers
1917	A	6	$1250	501-1310
	B	6	1345	1-297
1918	C	6	1350	2000-3199
	D	6	1450	501-889
	C-S	6	2445	1850-1950
1919	C	6	1600	3201-3389
	D	6	1745	1000-1132
	Number on front seat heel board			
	E	6	1845	101 up
	H	6	2850	100 up
	C-S	6	2445	1951-1968
1920	C	6	1695	4000 and up
	D	6	1845	1400 and up
	E-CS	6	2850	2000 and up
	H	6	....	100 and up
	E-CS-H	6	....	10000 and up
1921	DC & CS	6	1795	10000-20000
1922	8-R	6	1475	21400 up
	6-Y	6	985	1 up
	Number on upper toe board			

COMET

Year	Model	Cyls.	Price	Serial Numbers
1917-18	C-51	6	....	1-500
1919	C-52	6	....	500 up
1920	C-53	6	$2150	701 and up
1921	C-53	6	2450	
	Number under hood on dash, left side			
	Discontinued			

COMMONWEALTH

Year	Model	Cyls.	Price	Serial Numbers
1913	38	4	$ 975	A1000-A1366
1914	38	4	975	B203-A411
	20	4	495	B001-B174
1915	38	4	1075	A966-B36
	20	4	495	C195-CX17
1916	32	4	895	CX2-C194
1917	40	4	995	D219-D479
1918	40	4	995	DX732-DO883
1919	40	4	1395	 41999
1920	42	4	1395	42000 to 44000
1921	44	4	1595	
	Number plate on cowl			
1922	Production limited			

CROW-ELKHART

Year	Model	Cyls.	Price	Serial Numbers
1915	E-45	4	$1145	6501-7200
	E-65	6	2250	
	E-66	6	2350	
	E-25	4	725	
1916	CE-30	4	725	7201-9025
	CE-33	4	795	
1917	CE-33	4	935	9026-13295
	CE-35	4	845	
	Number plate on dash.			
1918	CE-32-34 & 36	4	$995	13296-15292
1919	CE-32-34 & 36	4	1095	15293-17411
	H-42-44 & 46	6	1355	
1920	S-65-64-63-67	6	1745	18900 to 19930
	L-65-64-63	4	1495	18901 to 19933
1921	L-63-65	4	1295	
	S-63-65	6	1545	
	Number on seat frame under front cushion.			
1922	Production Limited.			
	Taken over by Century Motors Co., Elkhart, Ind.			

COURIER

Year	Model	Cyls.	Price	Serial Numbers
1922	6	6	$1395	10000-10145
	Number on left front spring horn.			

CUNNINGHAM

Year	Model	Cyls.	Price	Serial Numbers
1912	J	4	....	181-305
1913	M	4	....	306-455
1914	R	4	....	456-755
1915	S	4	....	756-990
1916	V-1	8	....	991-1297
1917	V-2	8	....	1298-1597
1918-19	V-3	8	....	1601-2300
1920	V-3	8	....	2451 to 3000
1921	V-4	8	....	3000 up
1922	V-4	8	....	3000 up
	Number on left frame member near radiator.			

DAGMAR (CRAWFORD)

Year	Model	Cyls.	Price	Serial Numbers
1922	6T	6	$3500	001-0043

DAVIS

Year	Model	Cyls.	Price	Serial Numbers
1915	38	4	$1235	Contin'tl 4N, 1175-7082
	Six-50	6	2150	Contin'tl 6P, 1023-2920
1916	Six-F & G	6	1095	Contin'tl 7W, 1005-17650
	Six-E	6	1495	Contin'tl 6N, 1719-8693
1917	Six-H, I	6	1195	Contin'tl 7W, 17651-67452
	Six-K	6	1795	Contin'tl 7W, 17651-67452
	Six-J	6	1495	Contin'tl 7N, 14582-30983
1918	Six-H, I, L	6	1485	Contin'tl 7W, 5001-5600
	Six-K	6	1850	Contin'tl 7W, 5001-5600
1919	Six-H, I, L	6	1685	5001-6000
	Six-N & P	6	2300	
	Six-J, M	6	2050	
	Number on left rear motor arm			

DAVIS—Continued

Year	Model	Cyls.	Price	Serial Numbers
1920	51	6	$2185	6001 to 7885
	52	6	2225	
	53	6	2350	
	54	6	3185	
	55	6	3185	
	56	6	2225	
	57	6	2350	
1921	D-19	8	5350	6001X to 8549
1922	71	6	1295	10000-10637
	61-67	6	1595	8891-9442
	Numbers on left side of crankcase			

DANIELS

Year	Model	Cyls.	Price	Serial Numbers
1916	A	8	....	103-257
1917	A	8	....	258-302
	B	8	....	401-560
1918	A	8	....	361-383
	B	8	....	561-741
1919	B	8	....	742-873
	Number on top of front gear case cover; engine number on crankcase near distributor.			
1920	D	8	$4500	1100 and up
	C	8	....	1000 and up
1921	D-19	8	5350	1100-1769
1922	D-19	8	4350	1838-2087
	Number on dash board on right hand side			

DETROITER

Year	Model	Cyls.	Price	Serial Numbers
1916	F	4	$ 985	15000-20000
	6-45	6	1098	
1917	6-45	6	1195	20000 up
	Discontinued. Number on dash plate			

DIRECT DRIVE—See Champion

DISPATCH

Year	Model	Cyls.	Price	Serial Numbers
1920	D-G-1	4	$1350	B-20-1 and up
	H-E	4	....	B-20-1 and up
	Discontinued			

DIXIE FLYER

Year	Model	Cyls.	Price	Serial Numbers
1916	L	4	$ 795	Under 2200
1917	L-X	4	895	2200-3500
1918	L-S	4	995	
			1095	3500-5000
1919	H-S-50	4	1365	5000 up
1920	H-S-50	4	1465	7001 to 11000
1921	H	4	1445	9000-10300
1922	H	4	1175	10300-12000
	Number on dash at left hand spring horn			

DODGE

Year	Model	Cyls.	Price	Serial Numbers
11-14-14 to 10-31-17		4	....	1-200000
8-18-15 to 2- 1-18		4	....	25000-225000
2- 9-16 to 4-26-18		4	....	50000-250000
6-15-16 to 8- 8-18		4	....	75000-275000
10-23-16 to 12-13-18		4	....	100000-300000
2-17-17 to 3-19-19		4	....	125000-325000
5- 1-17 to 3-19-19		4	....	150000-250000
8- 3-17		4	....	175000-275000
Number stamped on frame under floor board; engine number on left side just above carburetor.				
1920	Touring	4	$1185	423641 to 569548
	Roadster	4	1185	
	Sedan	4	2000	
	Coupe	4	1850	
	Number stamped on the right head motor leg			
1921		4	$985	569549 to 663096
1922		4	880	663000-826401
Number on plate on toeboard, also on right side of center frame cross member.				

DORRIS

Year	Model	Cyls.	Price	Serial Numbers
1915	I-A-4	4	$2250	6111-6220
1916				
1916	I-A-6	6	2475	8001-8140
1917	I-B-6	6	2475	8141-8289
1918	I-C-6	6	2985	8300-8392
	Number on name plate left side of motor			
1919	6-80	6	$4350	8401-8658
1920	6-80	6	4350	8675 to 9000
				9017 to 9088
1921	6-80	6	4785	
1922	6-80	6	3950	9201-9330
	Serial number on top of crankcase			

DORT

Year	Model	Cyls.	Price	Serial Numbers
1915	M-4	4	$ 540	
	M-5		680	
1916	M-5A	4	725	
1917	M-6	4	695	
	M-9		695	9204-24368
	M-9S		1065	Up to Feb. 21, 1918
	M-9T		815	
1918-19	M-8	4	865	
	M-8C		1265	
	M-11		865	24369-49330
	M-11S		1265	Up to Oct. 4, 1918
	M-11T		1000	
1920	M-15		985	
	M-15S		1535	49331 up
	M-10		985	
	M-10C		1535	
Number on frame under left head lamp, also on shroud board				
	15	4	$985	51673 to 77951
Starting number Nov. 1919. Ending Nov. 1920.				
Number on dash under hood				

DORT—Continued

Year	Model	Cyls.	Price	Serial Numbers
1921	17-12	4	$985	80459 to 87850
1922	19-14	4	885	87856-95699
	Number on plate on left side dash			

DUPONT

Year	Model	Cyls.	Price	Serial Numbers
1921	A	4	$3400	
1922	A	4	3200	1-500
	Serial numbers do not run consecutively			
	Number on right side of upper crankcase			

DURANT

Year	Model	Cyls.	Price	Serial Numbers
1921	A-22	4	$ 890	1 to 2325
1922	A-22	4	890	
	Number on right side of dash under hood			
As Durant cars are numbered by manufacturing zones, it is best to obtain serial numbers from Durant Motor Co., Long Island City, N. Y.				
	B-22	6	$1650	X100-4682
	Number on plate on front dash under hood			

EARL

Year	Model	Cyls.	Price	Serial Numbers
1921	40	4	$1095	70000 to 70433
1922	40	4	1095	70434-74363
	Number on front of dash			

ESSEX

Year	Model	Cyls.	Price	Serial Numbers
1918			....	A-5000, A-34999, A-35000, A-39999
1919	A	4	$1595	5000-25000
			1595	60000-63000
			2250	70000-75004
1920	5-A to 7-A	4	....	5000 to 52999
	5-A to 7-A	4	....	53000 to 59999
	5-A to 7-A	4	....	6000 to 68999
	5-A to 7-A	4	....	69000 to 69999
	5-A to 7-A	4	....	70000 to 83999
	5-A to 7-A	4	....	84000 to 84999
	5-A to 7-A	4	....	85000 to 89499
	5-A to 7-A	4	....	89500 to 89999
	These numbers effective Dec. 1, 1920.	4	....	600000 to 749999
		4	....	750000 to 779999
		4	....	800000 to 834999
		4	....	835000 to 839999
		4	....	840000 to 848999
		4	....	849000 to 849999
		4	....	850000 to 874999
		4	....	875000 to 876999
		4	....	900000 to 907999
		4	....	908000 to 909999
1921		4	1445	910000 and up
1922		4	1095	
	Serial Number on dash			
	Serial numbers are not designated on a yearly basis			

ELCAR

Year	Model	Cyls.	Price	Serial Numbers
1916	A	4	....	500-2000
	B	4	....	500-2000
1917	D, E, F	4	....	2001-4999
1918	D, E, G	4	....	5000-5930
	D, E, G	6	....	10000-10860
1919	D, H, G	4	....	5931-9999
	D, H, G	6	....	10861-14999
1920	Touring	4	$1495	15000 and up
	Sportster	4	1495	15000 and up
	Coupe	4	2095	15000 and up
	Sedan	4	2195	15000 and up
	Touring	6	1795	25000 and up
	Sportster	6	2395	25000 and up
	Coupe	6	2395	25000 and up
	Sedan	6	2495	25000 and up
	Number on dash			
1921	K-4	6	1300	20000-21000
	7-R	6	1700	21000-32000
1922	K-4	4	1095	20000-25000
	7-R	6	1395	30000-33000
	Number on right rear spring horn			

ELGIN

Year	Model	Cyls.	Price	Serial Numbers
1916	6	6	$ 845	1-1720
1917	17	6	985	17-100—17-3900
	17	6	1095	17-3901—17-6964
1918	17	6	1165	17-6965—17-7400
	17	6	1235	17-7400—17-7764
1919	H	6	1395	101-1500
	H	6	1485	1501—2600
1920	K	6	1485	K-2601 to K-10638
Number plate on 1916-1917 and 1918 models, located on dash, right side, under hood. On Series H models, number plate on right front side. On Series H sedan models, number plate on dash, right side.				
1921	K-1	6	1495	
	1922 Production Limited			

EMPIRE

Year	Model	Cyls.	Price	Serial Numbers
1913-14	31	4	$ 950	315750-318672
1914	31-40	4	900	405101-406190
1915	33	4	975	331001-333300
	40	4	975	401001-401675
1916-17	45	4	935	451001-452603
	60	6	1095	601001-603412
1917-18	50	4	1125	50001 up
	70	6	1345	70001-70350
	70-A	6	1375	70A001-70A710
	73	6	1360	73001-73059
	Discontinued			
	Number on heel board of front seat			

F. R. P.

Year	Model	Cyls.	Price	Serial Numbers
1914	A-45 and B	4	$7000	1-100
1915	A-45 and B	4	7000	1-100
1916	A-45 and B	4	7000	1-100
1917	A-45 and B	4	7000	1-100
1918	B-45	4	....	

Name changed to Porter

FORD

Year	Cyls.	Price	Serial Numbers
10-1-12—9-30-13	4	$ 690	15001-332500
10-1-13—7-31-14	4	....	332501-539000
8-1-14—7-31-15	4	....	539001-855500
8-1-15—7-31-16	4	....	855501-1362200
8-1-16—7-31-17	4	....	1362201-2113500
8-1-17—7-31-18	4	....	2113501-2756251
8-1-18—7-31-19	4	....	2756252-3277851
8-1-19—9-30-19	4	....	3277852-3429400
1920.....	4	525	3659971 to 4698420
1-1-21—12-3-21	4	510	4698416 to 5638071
1922	4	348	5638072-6953071

Number stamped on left side cylinder block just above water inlet compression. Car and engine number the same from May 1, 1915.

FRANKLIN

Year	Model	Cyls.	Price	Serial Numbers
1914	M (Ser. 4)	6	....	16861-16894 and 18189-18205
	M (Ser. 5)	..	....	16895-17000 and 19000-19510
1915	M (Ser. 6)	..	....	19511-20643 and 18311-18527
	M (Ser. 7)	..	....	20644-21980 and 18528-18658
1916	M (Ser. 8)	..	....	21981-25234 and 18654-19000 26001-26175
	A (Ser. 9)	..	....	40001-59572 and 90001-100000 27001-28387
1917 1918 1919	B (Ser. 9)	..	....	29001 up
1920	S-9B Touring	6	$2850	68900 to 73476
	Sedan	6	3950	93852 to 95000
	Sedan	6	3950	95052 to 96500
	Sedan	6	3950	99101 to 99999
	Sedan	6	3950	80001 to 8345
	Brom.	6	3900	97371 to 98604
	4-Pass.	6	2850	41779 to 42427
	2-Pass.	6	2800	29843 to 30134
	Demi-Coupe	6	....	39101 to 39109
	Demi-Sedan	6	....	39500 to 39501
1921	9-B	6	2650	100000 and up
1922	9-B	6	1950	133001 up

Number on rear sill of body

GARDNER

Year	Model	Cyls.	Price	Serial Numbers
1920	G	4	$1125	1000 and up
1921	TRG	4	995	6498-10001
1922	TR	4	895	9674-A—18001-A

Number on right hand side under front cushion

GERONIMO

Year	Model	Cyls.	Price	Serial Numbers
1918	6A-45	6	$1550	400-500
1919	6A-45	6	1550	501-650

Number on front of cowl
Discontinued

GLIDE

Year	Model	Cyls.	Price	Serial Numbers
1913	45	4	$2150	1300-1400
1914	36	4	1890	5100-5600
1915	30	4	1195	7000-7600
1916	Lt. Six 40	6	1095	9000-9500
1917	Lt. Six 40	6	1125	9501-10000
1918	Lt. Six 40	6	1655	10001-10555

Discontinued

Numbers on models up to 10000 on name plate inside channel of the front frame horn. Number on cars from 10000 to 10555 on instrument board.

GRANT

Year	Model	Cyls.	Price	Serial Numbers
1915	T	6	$ 750	5000-7053
1916	V	6	795	10000-14002
1917	K	6	825	15000-27000
1918	G	6	1055	30001-40001
1919	....	6	1120	
1920	H	6	1550	50001 and up
	HY	6	1550	51700 and up
	HX	6	1785	51300 and up
1921	6	6	1550	

Number on dash under hood
Discontinued

H. C. S.

Year	Model	Cyls.	Price	Serial Numbers
1920	2	4	$2975	1-550
1921	3	4	2475	601-1419
1922	3	4	2400	601-1699

Number on dash and on cross member of frame

HACKETT (Name changed to Lorraine in December, 1919)

Year	Model	Cyls.	Price	Serial Numbers
1917	5-pass	4	$ 885	50-501
1918	5-pass	4	985	534-594
1919	5-pass	4	1125	601-694

Number on dash under hood, and on end of frame
Discontinued

HAL

Year	Model	Cyls.	Price	Serial Numbers
1916	12	12	$2100	Can be distinguished by straight windshields and carpet paneling on back of front seat.
	12	12	2385	Introduced September, 1916. Can be recognized by walnut paneling on front seat back.
1917	12	12	2600	A new pocket-style tire carrier is fitted.
1918	25	12	3600	

Discontinued

HALLADAY

Year	Model	Cyls.	Price	Serial Numbers
1920	20	6	$1885	20001-20999
1921	21	6	1985	

Number on dash
Discontinued

HANSON

Year	Model	Cyls.	Price	Serial Numbers
1918	A-45	6	$1685	1001-1025
1919	A-45	6	1685	1026-1625
1920	....	6	....	1700 up

Number on right side heel board under front seat; engine numbers left side crank case.

1921	54-T	6	.....	2395 to 2530
	60-S	6	$2285	4500 to 4615
1922	60	6	1585	9000 up

Number on left front seat riser

HARROUN

Year	Model	Cyls.	Price	Serial Numbers
1917	A-A-1	4	$ 695	101-549
1918	A-A-1	4	895	550-2381
1919	A-A-1	4	995	2382-2624
1921	A-A-2	4	1195	

Number plate on right side front seat, under cushion
Discontinued

HATFIELD

Year	Model	Cyls.	Price	Serial Numbers
1919	A-42	4	....	——678
1920	A-42	4	....	700 up
1921	A-42	4	$1495	....
1922	A-42	4	1345	

HAYNES

Year	Model	Cyls.	Price	Serial Numbers
1914	26	6	$2700–3200	
	27	6	2785–3830	6601-8499
	28	4	1985–2700	
1915	32	4	1660–2500	
	30	6	1485	8552-10949
	31	6	2250–3000	
	33	6	1550	
1916	34	6	1385	
	34	6	1485	
	35	6	1495	
	37	6	1725–2250	10951-15999
	36	6	1595–1750–2150	
	41	12	2225–2890	21000-24000
	40	12	2095–2760	
1917	36	6	1595–2260	16002 up
	37	6	1725–2390	
1918	38-39	6	2150–3250	29650 up
	44	12	2910–3985	21000-24000
1919-20	45	6	2685–4200	32894 up
	46	12	3450–4200	21364 up

Number plate on cowl at extreme right; also on timing gear housing.

1920	47	6	....	38000 and up

Number on dash

1921	48	12	$3635	....
	55	6	1985	46000 to 50700
	75	6	2395	75500 to 76800

Number between cylinder block and radiator on crankcase

1922	75	6	$2395	
	55	6	1595	
	88	12	3595	

Number on right hand front motor support
Serial numbers did not run consecutively in 1924

HOLLIER

Year	Model	Cyls.	Price	Serial Numbers
1915	158T	8	$ 985	1-580
	158R	8	985	1-60
1916	168T	8	985	580-623
1917	176T	6	1085	1-35
	176R	6	1085	1-35
	178R	8	1185	1-51
1918	186T	6	1185	
	188T	8	1385	6194-7010
1919	206T	6	1785	10001-10083
1920	206B	6	1985	10083 up

Number on heel board of front seat
Discontinued

HOWARD—See Lexington

HOLMES

Year	Model	Cyls.	Price	Serial Numbers
1918	1	6	$2900	1-500
1919	2	6	2900	500 up
1920	3 Touring	6	3350	
	3 Roadster	6	....	
	3 Sedan	6	....	19851 to 40000
	3 Coupe	6	....	
1921	Series 4	6	3350	
1922	4	6	2500	40310 up

Number on right side rear end of frame

HUDSON

Year	Model	Cyls.	Price	Serial Numbers
1914	54	6	....	56501-61700
	40	6	....	63001-77201
1915	40	4	....	73501-90000
	54	6	....	59001-62000
1916	40	4	....	G10001-G40000
1917	H	6	....	H1-H99999
	J	6	....	1-96499
	4J	6	....	75000-97999
1918	M	6	....	5000-97499
1919	O	6	....	5000-90999

Numbers on all cars in right hand frame. Also on left side dash under hood. Cars are not designated by yearly models but by a prefix letter such as H, J, M, O.

1920*	O	6	$2600	5000 to 364999
	O	6	....	370000 to 389999
1921*	Super 6	6	2250	400000 to 499999

*These numbers effective December 1, respectively.

1922	6	6	1645	

Serial numbers are not designated on a yearly basis

HUFFMAN

Year	Model	Cyls.	Price	Serial Numbers
1919	W	6	$1795	
1920	R	6	1995	1776 to 2814
1921	R	6	1795	2135 and up
1922	R	6	1395	

Number on left front frame horn

HUPMOBILE

Year	Model	Cyls.	Price	Serial Numbers
1914	H-A	4	$1200	
	32	4	1050	40001-52000

Number on sector plate center of dash

1915	K	4	$1200	52001-60000
	N	4	1085	
1916	N	4	1185	
	N U	4	1340	
1917	N	4	1285	60000-87519
	N U	4	1440	
	N	4	1385	
	N U	4	1540	

Number plate on dash near speedometer

1918	R	4	$1250 1350 1350	R1-R15000
1919	R	4	1335	
	R3	4	1450	R20001 up

Number plate on dash at steering column

1920	R-3	4	$1685	29000 to 30000
	R-4	4	1685	30001 to 39999
	R-5	4	1685	40000 and up

Number on plate inside cowl

1921	R	4	$1485	47500-61100
1922	R	4	1250	61100-95000

Number on plate where steering column joins dash

INTER STATE

Year	Model	Cyls.	Price	Serial Numbers
1915	T	4	$1000	7100-11503
1916	T	4	850	11504-14528
1917	T	4	850	14529-19108
1918	T	4	1000	19109 up

Discontinued. Number plate under front seat

JACKSON

Year	Model	Cyls.	Price	Serial Numbers
1915	44	4	$1135	
	48	6	1650	
1916	34	4	985	
	46	4	1375	
	348	8	1195	
	68	8	1685	
1917	34-A	4	985	
	348-A	8	1195	
	68-A	8	1685	
	349	8	1295	
	350	8	1195	
1918	349	8	1495	
			2195	

Number plate on dash or on front seat heel board

1920	6-38	6	$2150	25000 to 27842
1921	6-38	6	1950	

Number on end of front seat

1922	6-38	6	$1485	26392-26429

Number on right hand rear cross tube

JEFFERY

Year	Model	Cyls.	Price	Serial Numbers
1915	Six	6	$1650	47000-53999
1916	4-62	4	1000	57000-60500
	6	6	1350	68000-69500
1917	472	4	1095	61000-78000
	671	6	1465	86000-96000

For later models see Nash
Number to left of front frame cross member

JONES

Year	Model	Cyls.	Price	Serial Numbers
1915	1915	6	....	1-1999
1916	1916	6	....	2000-2999
1917	26-A	6	....	3000-5000
	26-B	6	....	

JONES—Continued

Year	Model	Cyls.	Price	Serial Numbers
1918	27-A, 29D	6	....	5001-6000
1919-20	27-A-E	6	....	6001 up

Number under the hood, on right side of cowl board, and stamped on ends of both front spring hangers.
Discontinued

JORDAN

Year	Model	Cyls.	Price	Serial Numbers
1917	60	6	$1650	151-2157
1918	60	6	1995	2157-5298
1919	F	6	2775	5401 up
1920	M	6	2450	10001 up
1921	M	6	2250	
		Number under hood		
1922	MX	6	$1795	21019-25000

Number on left hand side of front cross member

KELSEY

Year	Model	Cyls.	Price	Serial Numbers
1921	GWOV	6	$1800	102-110
1922	G & B	4	985	1000-1016 4000-4081

Number on left hand side of instrument board

KING

Year	Model	Cyls.	Price	Serial Numbers
1915	C	4	$1150	2201-3005
	D	8	1350	
1916	D	8	1350	4000-8000
	E	8	1585	12000-14950
1917	EE 1st Ser.	8	1650	16000-17800
	EE 2d Ser.	8	1650	18000-18099
1918	F	8	2150	20001-25000
1919	G	8	2350	30001-30629, 32976, 36378, 35022
1920	H	8	....	H-1, H-2001, H-4001 and H-5001 up

Numbers on dash plate, except 1915 models, which are on heel board under front seat.

1920	Touring	8	....	1000 to 2000
	Foursome	8	....	2001 to 4000
	Road King	8	....	4001 to 5000
	Limousine	8	....	5001 to 6000
1921	J	8	$2725	JT1001 & KF3001
1922	K	8	1795	KT-3501 up

Number below cushion on heel board

KISSEL KAR

Year	Model	Cyls.	Price	Serial Numbers
1915	4-36	4	$1450	16001-16575
	6-42	6	1850	25001-25455
1916	32-4	4	1050	30001-33001
	36-4	4	1250	16576-20000
	42-6	6	1485	25456———
1917	100 pt. 6	6	1195	38-101 up
	Double 6	12	2250	12-101 up
1918	100 pt. 6	6	1495	
	Double 6	12	2250	
1919	Cus. Bld.	6	2875	45-101 up
	Cus. Bld.	6	2450	45-200 up
1920	Cus. Bld.	6	3475	
1921	45	6	3475	
1922	45	6	1885	

Number plate on dash under hood. On models built since 1915 car number stamped on front end right frame member adjacent to right head lamp. Engine number on right front motor arm. Numbers are not given in years as the numbers do not close one year to begin another.

KLINE

Year	Model	Cyls.	Price	Serial Numbers
1915	6-42A	6	$1750	2100-2500
1916	6-36E	6	1095	3000-3599
1917	6-38F	6	1295	3600-4500
	6-38G	6	1395	4600-4999
1918	6-38GA	6	1495	5000-5800
1919	6-42	6	1865	6000-7000
1919-20	6-55-J	6	1965	7000 to 7999
			2290	7000 to 7999
1921	55-K	6	2290	
1922	6-55-K	6	1690	8000-8499

Number plate on right front seat floor board

LEACH

Year	Model	Cyls.	Price	Serial Numbers
1921	999	6	$5200	8000 to 975
1922	Production Limited			

On instrument under hood

LAFAYETTE

Year	Model	Cyls.	Price	Serial Numbers
1920	8	8	$5625	1001 and up
1922	134	8	4850	
		Number on front floor board		
1922	134	8	$4090	1731-2284

Number on front motor leg, right side

LEXINGTON (Formerly Howard)

Year	Model	Cyls.	Price	Serial Numbers
1915	4-K	4	$1375	
	6-L	6	1875	
	6-M	6	2575	
1916	6-N	6	1875	

Number plate on dash, right side, under hood

	6-O-16	6	$1075	
1917	6-O-17	6	1185-1285	

Number plate on dash, right side under hood, and on top of fly-wheel housing.

	6-P	6	$2875	

Number plate on dash, right side under hood

1918	O	6	$1345	
	R	6	1585-1685	

Number plate on dash, rignt side under hood, left front spring and on left rear kick-up.

1919	R-19	6	$1785	17296
1920	S	6	1885	18001 up

LEXINGTON (Formerly Howard)—Continued

Year	Model	Cyls.	Price	Serial Numbers
1921	S	6	$1885	19001 and up
	T	6	2785	30001 and up
1922	S	6	2100	26548-26592
	T	6	2285	31120-31308

Number plate on dash, right side under hood, on left front spring crown, left rear motor arm, and on right side of rear side rail. Number on right front spring hanger.

LENOX

Year	Model	Cyls.	Price	Serial Numbers
1915	A1 D1	4	$2000	2015
	M1	6	2465	1551-1563
1916	O	6	2500	2500
1917	O	6	2510	2530
1918	Ser. 33	6	2550	2554

Discontinued

LIBERTY

Year	Model	Cyls.	Price	Serial Numbers
1916	10-A	6	$1095	30501-31500
1917	10-B	6	1195	31501-33500 approx.
1918	10-B	6	....	33501-36450
1919	10-B	6	....	36451-42250
1920	10-C	6	1985	50500 up

Numbers on left side front frame end; motor numbers, 21001 to 27001, on left side of motor.

1921	10-C	6	$1795	54000-56000
1922	10-D	6	1395	56000-58400

Number on left side frame channel just ahead of radiator

LINCOLN

Year	Model	Cyls.	Price	Serial Numbers
1920	....	8	$4600	1 and up
1921	....	8	4300	835-3151
1922	....	8	3800	3152-8709

Number on front of dash on right side

LOCOMOBILE

Year	Model	Cyls.	Price	Serial Numbers
1912	L	4	$3500	
	M	6	4800	
1913	L	4	3600	
	R	6	4400	
	M	6	5100	
1914	38 RD & LD	6	4400	
	48 RD & LD	6	5100	
1915	38R-5	6	4400	
	48M-5	6	5100	(Decline to give serial numbers)
1916	38	6	4400	
	48	6	5100	
1917	38	6	4600	
	48	6	4600	
1918	38	6	5000	
	48	6	5950	
1919	38	6	....	
	48	6	....	
1920	38	6	....	
	48	6	8100	17001 and up
1921	..	6	8600	
1922	48	6	7600	18101 up

Number on right side of dash column

LORRAINE (Previous to 1920 see Hackett)

Year	Model	Cyls.	Price	Serial Numbers
1920	20T	4	$1575	999 to 1999
		Number on dash		
1921	21T	4	$1665	999 and up

Discontinued

MAIBOHM

Year	Model	Cyls.	Price	Serial Numbers
1917	A	4	$ 830	1-500

Number plate on dash or under front seat

1918	B	6	$1290	501-2350
1919	B	6	1395	2351-6200
1920	B	6	1495	6300 to 8299

Number plate on left side engine. Engine number same as car number.
Discontinued. Name changed to Courier

MARMON

Year	Model	Cyls.	Price	Serial Numbers
1914	41	6	$3250	114002-814000
	48	6	5000	1114002-1814000
1915	41	6	3250	115002-815000
	48	6	5000	1215002-1815000
1916	41	6	3250	116002-816000
	34	6	2750	1516002-1816000
1917	34	6	3100-5500	317002-817000
1918	34	6	3550-6500	418002-818000
1919	34	6	3950-5750	419001-819001
1920	34	6	4650-6450	2200001-8200001
1921	34	6	3985	2220001 to 12220001
1922	34	6	3185	

Numbers on heel board of driver's seat and on left side of main frame.
Serial Numbers run according to body style and not consecutively.

MAXWELL

Year	Model	Cyls.	Price	Serial Numbers
1915	25	4	$ 695	
		Gas Light	750	14001-52000
		Electric Light		52001-113205
1916	25	4	655	
1917	25 7- 1-16	4	595	
	1- 1-17	4	635	113206-193800
	1- 1-17	4	665	
1918	25 7- 1-17	4	655	
	8- 6-17	4	745	193801-239822
	3- 1-18	4	825	

MAXWELL—Continued

Year	Model	Cyls.	Price	Serial Numbers
1919	25 7- 1-18	4	$825	
	10- 4-18	4	895	239823-266800
1920	25 7- 1-19	4	895	
	7-12-19	4	985	266801 up
1921	25	4	845	330201 up
1922	..	4	885	341708-388529

Number on name plate on right end of front seat base. Number on roadster appears on left side of driver's seat.

McFARLAN

Year	Model	Cyls.	Price	Serial Numbers
1912	26	6	$2100	500-1000
1913	27	6	2590	3000-4000
1914	65	6	2900	4000-6000
1915	77	6	2900	6000-7000
1916	107	6	2900	9000-10000
1917	127	6	3200	10000-11000
1918	127	6	3900	
			4300	18000 up
1919	127	6	....	19000-19999
1920	142-151	6	4800	20000 to 21000
1921	21	6	6300	
1922	..	6	6300	21000-21500

Number plate on dash and on right frame horn

MERCER

Year	Model	Cyls.	Price	Serial Numbers
1915	22-70	4	$3000	2099-2549
1916	22-72	4	3000	2550-3299
1917	22-73	4	3500	3300-4099
1918	Series 4	4	4200	
			4500	4100-4600
1919	Series 5	4	4200	
			4500	4600 up
1920	Series 5	4	4950	9001 and up
1921	5	4	4500	12000-16500
1922	5	4	3950	16500-19640

Number on right hand rear spring hanger

METEOR

Year	Model	Cyls.	Price	Serial Numbers
1920	R	4	$5000	625 and up
		Number attached to clutch		
1921	R & RR	4	$5500	

Discontinued

METZ

Year	Model	Cyls.	Price	Serial Numbers
1916	25	4	$ 600	36381-40248
1917	25	4	545	
1918	25	4	695	40249-44552
1919	Master Six	6	1695	45015-47508
1920	Master Six	6	1995	50646 to 51527

Number same as motor number and is found on side of motor

1921	M-6	6	$1995	

Discontinued

MITCHELL

Year	Model	Cyls.	Price	Serial Numbers
1915	B-35	4	....	50001-51800
	B-45	6	....	55001-56000
	B-48	8	....	57001-57100

Number plate on heel board of front seat on right engine guard, and on left front frame member.

1916	B-48	8	....	58000-60000
	C-42	6	....	60001-64905
1917	C-42	6	....	65001-69956
1917	D-40	6	....	70000-85000
1918	C-42	6	....	90000-95000
1919	E-42	6	....	95501-96495
1920	E-40	6	$1475	97001 to 106400
	E-42	6	1675	95501 to 96500
	F-40	6	1750	1 and up
	F-42	6	1995	12001 and up

Number on toe board. Serial numbers not carried under yearly designations.

1921	F-40	6	$1790	7001 and up
	F-42	6	1995	12001 and up
1922	F-50	6	1490	30000 up

MOLINE

Year	Model	Cyls.	Price	Serial Numbers
1915	MK-40	4	$1375	6001-6250
1916	MK-40	4	1450	6250-7012
1917	G-50	4	1840	8000-8330
	C-40	4	1495	9000-10999
1918	G-50	4	2250	8331-8450
	L-40	4	2000	11000-11220
			2500	
1919	G-50	4	2250	8451-8999
	L-40	4	2000	
			2500	11221-11600

Name changed to R & V Knight in December, 1919. Name on dash plate and on front left side of engine. Discontinued.

MONITOR

Year	Model	Cyls.	Price	Serial Numbers
1920	M	6	$1575	3316 to 4200

Number on end of right side
Discontinued.

MONROE (Indianapolis)

Year	Model	Cyls.	Price	Serial Numbers
1919	S-9	4	$1295	 16609
1920	S-9	4	1195	15599 to 18374
	S-10	4	1195	
1921	S-10	4	1295	
1922	S-11	4	950	18665-18989

Number under hood right side of dash

MONROE (Pontiac, Mich.)

Year	Model	Cyls.	Price	Serial Numbers
1915	2	4	$ 495	501 up
1916	4	4	1095	8000 up

MONROE (Pontiac, Mich.)—Continued

Year	Model	Cyls.	Price	Serial Numbers
1917	3	4	$ 565	4001 up
	6	4	1095	9151 up
1918	M-4	4	995	
	Discontinued			

MOON

Year	Model	Cyls.	Price	Serial Numbers
1915	4-38	..	....	14451-14500
	6-30	..	....	70000-70242
	6-40	..	....	61531-61953
	6-50	..	....	41354-41891
1916	6-30	..	....	70245-70666
	6-43	..	....	70667-71087
	6-44	..	....	62053-62252
	6-66	..	....	62253-66564
1917	6-43	..	....	71088-71393
	6-45	..	....	71394-71819
	6-66	..	....	66565-66884
	6-36	..	....	36000-36225
1918	6-36	..	....	36226-36996
	6-66	..	....	66885-67043
1919	6-46 Victory	..	....	46001-47551
	6-66	..	....	67044-66078
1920	6-48	6	$1885	48001 to 49317
	6-68	6	....	68101 to 68286
1921	6-48	6	2185	68286 and up
	Numbers are up to Sept. 15, 1920			
	Number on dash			
1922	6-40	6	1295	40001-44748
	6-58	6	1785	58001-58474

MOORE

Year	Model	Cyls.	Price	Serial Numbers
1919	30	4	$ 895	1600
		4	995	7000 8149
		4	1095	8000
1920	30	4	1095	8150 up

Number under hood on right side of body; engine number on right side of engine.

Discontinued

MURRAY MACK

Year	Model	Cyls.	Price	Serial Numbers
1921	80T	6	$4250	1050 to 1250
1922	Production Limited			
	Number on dash under hood			

NASH (Formerly Jeffery) No yearly models

Year	Model	Cyls.	Price	Serial Numbers
	681, 5-P Spt.	6	....	100101-100114
	681	6	....	100612-111600 127851-131825
	682, 7-P Tr.	6	....	111601-113601
	683	6	....	121001-122500
	684, Sedan	6	....	100108-100611 119851-121000 144331 up
	685, Coupe	6	....	94501-95000 119913-119928 144806-145405 131851, 133251, 133351 up
	687, 4-P Rd	..	....	Serial numbers on application.
1921	681-7	6	$1545	188437 to 195753
	682	6	1695	181130 to 208440
	41-4	4	1195	1345 to 7193
	Number on left front cross member, just back of radiator			
1922	691	6	1390	195754 up
	41-4	4	985	4511 up

NATIONAL

Year	Model	Cyls.	Price	Serial Numbers
1914	6-W	6	$2375	9001-10100
1915	AA	6	2375	10101-11100
1915-16	AB	6	2500	11101-14000
1916	AC	6	1690	14001-16000
	AD	12	1990	16001-17000
1917	AE	6	1750	17003-18000
	AH	12	2150	18001-20000
	AF-1	6	1995	20001-24000
	AF-2	6	2150	24001-25000
	AK-1	12	2595	25001-25550
1918	AK-2	12	2750	25551-27000
	AF-3	6	2150	27001-28000
1919	AL	6	2450	28001-28979
	AM	12	3050	32000-32148
1920	BB	6	3290	60000 up
	Sextet (6)	6	....	32149 and up
1921	BB	6	2990	
1922	BB	6	2475	60001 up

Numbers on cars up to 1913 inclusive will be found riveted to the rear cross member of the frame. All cars after 1913 have the serial number on the left side of the frame, either under the front or rear fender.

NELSON

Year	Model	Cyls.	Price	Serial Numbers
1917	A	4	$1800	1001-1082
	BB	4	1290	1004-1125
	C	4	1400	1059-1101
1918	D	4	1450	1112-1187
1919	D	4	1500	1188 up
1920	D	4	1700	1213 to 1500
1921	D	4	1900	

Number on dash plate; engine number top of right front crankcase arm.

1922 Discontinued

NOMA

Year	Model	Cyls.	Price	Serial Numbers
1920	1	6	$2900	300 to 600
1921	1C	6	3200	600 and up
1922	3C	6	2100	
	Number on front spring			

NORWALK

Year	Model	Cyls.	Price	Serial Numbers
1920	4-30	4	....	9000 to 9872
	Number on dash			
1921	430KS	4	$1135	
	Discontinued			

OAKLAND

Year	Model	Cyls.	Price	Serial Numbers
1912	30	4	$1200	7001-8000 11001-11500
	40	4	1450	8001-9000 9650-11000
	45	4	2100	9001-9500
1918	35	4	1075	35001-37500
	42		1600	40001-43601
	60	6	2400	60001-60951
1914	36	4	1200	360000-364000
	48	4	1785	480000-481150
	62	6	2500	620000-620100
1915	37	4	1200	370000-373599
	49	6	1685	490000-490500
	Number on front heel board			
1916	32	6	$ 795	320000-328000 330000-347100
	38	4	1050	380000-384001
1916-17	50	8	1585	500000-502000

Number on heel board of driver's compartment, or on left rear cross frame member.

1917	34	6	$ 875	134-3000034
1918	34-B	6	....	3000134 up
1919	34-B	6	....	1169934
1920	34-C	6	1165	11700134 to 15235634

1918 number on heel board; 1919 on heel board and on right rear side member.

1921	34-C	6	$1145	15235634 to 16755034
1922	34-D	6	1145	11700134-16755034

Number on frame opposite left rear wheel

OLDSMOBILE

Year	Model	Cyls.	Price	Serial Numbers
1915	42	4	$1285	84500-92499
	55	6	2975	92500-92999
1916	43	4	1095	93000-99999
	43	4	1095	109000-109499
	44	8	1195	
			1775	109500-118782
			1850	
1917	45	8	1775	
			1295	
			1850	119000-135276
			1367	
	45	8	1295	143000-144500
		8	....	148900-148925
	37	6	1095	150000 up
			1675	192000-200000
			1295	
1918	45A	8	1700	135277-142999 145000-149999
1919	37A	6	1395	37AT1 & 37AR1 up
			1895	37AS1 & 37AC1 up
	45B	8	1895	45BT1, 45BP1 & 45BS1 up
1920	45-B Touring	8	1395	45-B-T-1 to 45-B-T 8297
	45-B-P (Sport)	8	....	45-B-P-1 to 45-B-T 3062
	45-B-R-T Tour.	8	....	45-B-R-T-1 to 45-B-R-T 599
	45-B Sedan	8	....	45-B-S-1 to 45-B-S 1032
1921	43A	4	1445	7 to 10786
	47	8	1695	1 to 1990
	46	8	2100	49 to 625
1922	46	8	1735	
	47	8	1595	
	43A	4	1145	

Numbers on right, on cowl under hood on brass plate

Numbers do not run in consecutive order, but according to body styles.

OVERLAND

Year	Model	Cyls.	Price	Serial Numbers
1915	80	4	....	1-19993
	81	4	....	1-20399
	82	6	....	1-2846
1916	84	4	....	1-14080
	86	6	....	1-12008
	83 & 83B	4	....	1-101976
1916-17	75 & 75B	4	....	1-65693
1917-18	83 B. O. E.	4	....	
	85-4	4	....	1-51892
	85-6	6	....	1-18459
	90 & 90B	4	....	1

Number under front seat cushion stamped on front spring right hanger, or front end right side frame rail, except model 90 which is on right rear frame end.

1919	4	4	$ 845	100-31000
1920	4	4	945	Unable to get information from manufacturer.
	Number on left frame			
1921	4	4	$ 695	126926-174819
1922	4	4	550	174820 up

Number on metal plate left hand side of driver's seat

PACKARD

Year	Model	Cyls.	Price	Serial Numbers
1912	30	4	$4200	20001-23000
	48	..	....	23001-26000
	18	4	3200	26001-27000
1913	48	6	4850	35026-38000
1914	1-38	6	4150	38000-42000
	48	6	4850	50026-52000
	2-38	6	3350	53026-56000
	48	..	....	63026-66000
1915	3-38	6	3750	75026-76999
	5-48	6	4850	78026-78386
1916	1-25	12	2750	80026-90000
	1-35	12	....	
	2-25	12	....	125051-150000

PACKARD—Continued

Year	Model	Cyls.	Price	Serial Numbers
1916	2-35	12	....	
1917	2-25	12	$3050	
	2-35	12	3500	
1918	3-25	12	3700	150051 up
	3-35	12	4100	
1919	3-25	12	3950	
	3-35	12	4300	
1920	Twin Six	12	5550	160130 to 165662
	Number on right front leg of motor			
1921	Single Six	6	$2975	U9000 and up
	Twin Six	12	6000	S20000 and up
1922	Single Six	6	2485	U9000 up
	Twin Six	12	3850	S21000 up

Number on plate on dash directly back of change speed lever.

PAIGE

Year	Model	Cyls.	Price	Serial Number
1914-15	36	4	$1075	14000-20000
	46	6	1395	55000-59999
1915-16	36	6	1095	80000-81500
	46	6	1295	60000-66000
1916-18	46	6	1375	65600-69999
	38	6	1090	85000-89923
1917-18	39	..	1330	89924-101999
1918	39	6	1395	102001 up
	39	6	1690	102001 up
1917-18	51	6	1495	70000-74999
	55	6	2060	75000-79500
1919	55	6	2060	82001 up
	55	6	2165	82001 up
	Number plate under left front seat cushion.			
1920	15-19	6	$1595	200000 and up
	M-18	6	2195	118000 and up

Serial and motor numbers are together on the left side of motor.

1921	6-42	6	$1635	211903 to 217507
	6-66	6	2875	126314 to 130948
1922	6-44	6	1465	217480 up
	6-66	6	2245	130950 up
	Number under right hand front seat.			

PAN-AMERICAN

Year	Model	Cyls.	Price	Serial Numbers
1918	E-6-48	6	$1800	500-1200
	Number on frame horn			
1919	E-6-48			
	F-6-48	6	....	3000-3322
	G-6-48			
1920	E-6-55	6	$2250	3000 and up
	Number on left front spring hanger			
	Discontinued			

PATERSON

Year	Model	Cyls.	Price	Serial Number
1915	6-48	6	$1400	1000-1101
	4-32	4	1200	X100-X573
1916	6-42	6	995	301-1302
1917	6-45	6	....	5001-6986
1918-19	6-46	6	....	6869-9504
1920	6-47	6	....	1201 up 12101 up
	6-50	6	2100	1500 and up
	6-50	6	2130	
	6-50	6 Sedan	3300	18000 and up
		6 Coupe	3300	18100 and up
1921	6-50	6 Touring	1925	15000-15690
		Sedan	2895	18001 and up
1922	6-52	6	1550	
	Number on left side of seat			

PATHFINDER

Year	Model	Cyls.	Price	Serial Numbers
1915	....	..	$2222	
		..	2750	2002-2566
1916	Six	6	1695	
	Twelve	12	2475	2901-4175
1917	3-B	12	2750	8001-17525
	Discontinued			
	Number on dash plate			

PEERLESS

Year	Model	Cyls.	Price	Serial Numbers
1912	33	4	$4300	12001-12900
	35	6	4000	121000-121296
	36	6	5000	122001-122439
	37	6	6000	123001-123068
1913	35	6	4300	131001-131251
	36	6	5000	132001-132386
	37	6	6000	120368-123123
1914	36	6	5000	142001-142589
	37	6	6000	143001-143058
1915	36	6	5000	152001-152100
	54	4	2000	DD101-DD2500
	55	6	2250	EE101-EE5000
1916	Series 1	8	1890	16001-169000*
1917	Series 2 & 3	8	1890	170001-179000
1918	Series 4	8	2340	230001 up
	*To March 21			
1919	Series 5	8	2900	260000 to 286900
1920	Series 6	8	....	

Since 1916 series models instead of yearly models adopted.

Number on dash.

1921	56-S-7	8	$2990	270000-273687
1922	56-S-7	8	2790	271000-273787
	Number on metal plate attached to dash			

PIEDMONT

Year	Model	Cyls.	Price	Serial Numbers
1917	4-30	4	$1095	1-400
	6-40	6	1545	400-500
1918	4-30	4	1095	500-1000
	6-40	6	1545	1000-1200
1919	4-30	4	1235	1200-2500
	6-40	6	1685	2500-3000
	After Dec. 15, 1919, number on main floor board			

PIEDMONT—Continued

Year	Model	Cyls.	Price	Serial Numbers
1920	4-30	4	$1395	1800 to 3000
	6-40	6	1695	

Number on dash
Discontinued

PIERCE-ARROW

Year	Model	Cyls.	Price	Serial Numbers
1912	36 H. P.	6	$4000	32200-33200
				9199-9201-57
	48 H. P.	6	5000	9259-9321, 9323-9522
	66 H. P.	6	6000	
1913	38-C	6	4300	33301-34050
	48-B	6	5000	10301-11125
	48-D	6	5000	
	48-D2	6	5000	
	66-A1	6	6000	66601-66800
1914	38-C2	6	4300	34101-34603 and 34047
	48-B2	6	5000	11201-12100 and 11100
	66-A2	6	6000	66900-66964
1915	38-C3	6	4300	34701-35450
	48-B3	6	5000	12301-13050
	66-A3	6	6000	67050-67150
1916	38-C3	6	4300	35601-36350
	48-B3	6	5000	13051-13650
	66-A3	6	6000	67050-67150
	38-C4	6	4300	36601-37605
	48-B4	6	5000	13901-14900
	66-A4	6	6000	67201-67405
1917	38-C4	6	4300	37701-38701
	48-B4	6	5000	15001-16000
	66-A4	6	6000	67499-67800
1918	48-B4	6	5000	16001-16400
	48-B5	6	6500	16401-17400
				511001-511375
1919	48 H. P.	6	7750	512001-512375
				513001-513300
	38 H. P.	6	7250	311001-311375
				312001-312375
1920	38	6	7250	313001 to 313500
	38	6	....	314001 to 314500
	48	6	7750	514001 to 514500
	48	6	....	515001 to 515700
1921	....	6	7500	321001-322999
1922	33	6	5250	331001 up

Number beneath left front door

PILOT

Year	Model	Cyls.	Price	Serial Numbers
1915	55	6	$1885	1700-1755
1916	6-45	6	1100	
	6-55	6	1685	1756-2070
	8-55	8	1785	
1917	6-45	6	1150	2071-2999
1918	6-45	6	1295	3000-3575
1919	6-45	6	1650	3575 up

Number on left frame horn

1920	6-45 5-pass. Tour.	6	$1895	
	6-45 4-pass. Road.	6	1945	4380 to 5044
	6-45 5-pass. Sedan	6	2900	
	6-45 4-pass. Coupe	6	2850	
1921	6-45	6	1895	
	6-50	6	2285	
1922	6-45	6	....	5189-5300
	6-50	6	2000	6200-6499

Number on left front frame horn

PORTER—(Previous to 1919, see F. R. P.)

Year	Model	Cyls.	Price	Serial Numbers
1919-20	46	4	$6750	110 to 519

Number on right hand front spring

1921	40	6	$6750	519 and up

Discontinued

PREMIER

Year	Model	Cyls.	Price	Serial Numbers
1914	A	6	$3900	12000-13000
1915	6-50	6	3700–3900	65150-1615000
1916	6-51	6	3900	
1917	6B	6	3200–3400	0001-2912
1918	6C	6	3200–3710	
1919	6C	6	3200–3400–3710	3501-4511
1920	6D	6	4600	5011 and up

1912 to 1916, inclusive, number left frame member, center and near step hanger.

1921	6-D	6	$3690	5001-6799
1922	6-D	6	3100	6800-6845

Number under front cushion on left side, on right starting crank on front cross member, and on front spring hanger.

PREMOCAR

Year	Model	Cyls.	Price	Serial Numbers
1921	6-40A	6	$1295	
1922	6-40	6	1095	

RANGER

Year	Model	Cyls.	Price	Serial Numbers
1920	A-20	4	....	1001 to 13000

Discontinued

REGAL

Year	Model	Cyls.	Price	Serial Numbers
1914	T	4	$1125	7701-9000
	C	4	1350	453-600
1915	D	4	1085	10171-11254
1916	E	4	650	3074-3525
	D	4	985	11255-11550
	F-8	8	1200	244-550

REGAL—Continued

Year	Model	Cyls.	Price	Serial Numbers
1917	J	4	695	24382 up

Discontinued

Number on left hand frame member at spring

R. & V. KNIGHT

Year	Model	Cyls.	Price	Serial Numbers
1920	J	6	$3150	20000 and up
	R	4	2150	50000 and up
1921	R	4	2150	50000-50700
	J	6	3350	20701-20999
1922	R	4	1665	5701-50999
	J	6	2475	21001-21999

Number on name plate on dash and on right side of motor

REO

Year	Model	Cyls.	Price	Serial Numbers
1915	R-5, S-5, L	4	$1050	64001-76000
	M	6	1385	101-2100
1916	R-5, S-5	4	875	76001-96000
	M, N	6	1250	2101-10200
1917	R-5, S-5	4	875	96001 up
	M, N	6	1150	10201 up
1918	M	6	1385	10100 up
1920	T-6 Touring	6	1750	
	T-6 Sedan	6	2750	24301 and up
	U-6 Roadster	6	1750	
	U-6 Coupe	6	2750	
1921	T-6	6	1850	
1922	T-6	6	1595	37800-49500

Number on heel board

REVERE

Year	Model	Cyls.	Price	Serial Numbers
1920	C-D	4	$4250	
1921	C	4	4650	
1922	C	4	3200	1600-1653

Number on left side front cross members

RICKENBACKER

Year	Model	Cyls.	Price	Serial Numbers
1922	A	6	$1485	1-5000

Number on plate at heel board, left side

ROAMER

Year	Model	Cyls.	Price	Serial Numbers
1916	All	..	....	10500-13500
1917	All	6	....	13501-15750
1918	All	4 & 6	....	13751-16970
1919	All	6	....	16971 up
1921	654-E	6	$2650	

Number on dash board

1922	6-54E	6	$2585	23020-24644
	4-75E	4	3585	23020-24644

Number on front right side rail

Manufacturers of this car state that it is impossible to give consecutive serial numbers.

ROCK FALLS

Year	Model	Cyls.	Price	Serial Numbers
1920	12	6	....	12001 and up

Number over motor's manufacturing plate
Discontinued

ROSS

Year	Model	Cyls.	Price	Serial Numbers
1916	A	8	$1350	1003-1495
1917	C	8	1550	1496-1721

Discontinued

SAXON

Year	Model	Cyls.	Price	Serial Numbers
1915	A	4	$ 395	100-9740
	A-2	4	395	101-519
	B	4	395	10102-15082
	B-2	4	395	342-735
	S	6	785	101-4843
1915-16	14	4	395	101-9574
	S-2	6	835	5101-19199
	S-2-R	6	835	101-2100
1917	B-5-R	4	495	9601-X20543
	B-6-R	4	495	X1-X128
	B-7-R	4	495	X790-X1222
1917-18	S-4-T	6	1045	19201-X40602
	S-4-R	6	995	2101-X5192
	S-4-S	6	1350	30700-X42973
1918	Y-18-R	6	1195	101
	Y-18-T	6	1195	1201
1919	Y-18-T	6	1295	7650 up
	Y-18-R	6	1295	1031 up
1920	125	6	1195	90001 and up

Number on top of the left hand frame side bar next to radiator

1921	125	4	$1495	

Discontinued

ROLLS ROYCE

Year	Model	Cyls.	Price	Serial Numbers
1922	....	6	$10900	

Serial numbers strictly confidential, refer factory, Springfield, Mass.

SAYERS

Year	Model	Cyls.	Price	Serial Numbers
1918	P	6	$1695	5100-5300
1919	A-P	6	1745	5301-5700
	B-P			
1920	C-P	6	2095	5701 to 6000
	D-P	6	2195	6001 to 6600
1921	D-P	6	2195	6350-7000
1922	D-P	6	1695	7001-7100

Number on cowl under hood

SCRIPPS-BOOTH

Year	Model	Cyls.	Price	Serial Numbers
1915	C	4	$ 775	101-3100
1916	C	4	825	3101-7260
	D	8	1175	101-800

SCRIPPS-BOOTH—Continued

Year	Model	Cyls.	Price	Serial Numbers
1917	C	4	$ 935	7261-8146
	D	8	1285	801-1807
	G	4	935	6-800
1918	G	4	1065	801-1800
	H	8	1285	2-325

Number plate on heel board, right hand seat

	6-39	6	$1295	9001-11599
	6-40	6	1295	9002-11599
	6-41	6	1985	11432-11599
	6-42	6	1985	11434-11599

Number plate on seat board under front seat cushion

1919	G	4	$1065	1801-3000
	6-39	6	1295	11600

Number plate on right seat heel board

	6-40	6	$1295	11600-18759
	6-41	6	1985	11600-12432
	6-42	6	1985	11600-16419
	A-41	6	2175	16420 up
	A-42	6	1995	18410 up
1920	B-39	6	1425	
	B-40	6	1425	20250-29360
	B-41	6	2175	
	B-42	6	2295	

Serial numbers under cushion of front seat

1921	B-39-42	6	$1295	29360 and up

Discontinued

SENECA

Year	Model	Cyls.	Price	Serial Numbers
1917	A	4	$735-$850	500-1000
1918	D	4	....	1000-2000
1919	H			
1920	L	4	1185	
	O	4	....	2001 up
	M	4	....	
1921	L & O	4	1045	2420-2999
1922	50, 51	4	1095	3001-3900

Number on dash and under hood and on left frame rail in front of radiator.

SINGER

Year	Model	Cyls.	Price	Serial Numbers
1915	....	6	....	751-760
				7500-7600
1916	....	6	....	7601-7784
1917	....	6	....	7785-7795
				77100-77902
1918	....	6	....	77903-77904
				18905-18999
1919	....	6	....	19000-19940
1920	....	12	....	20101 up

Number on front spring front horn bracket
Discontinued

SKELTON

Year	Model	Cyls.	Price	Serial Numbers
1920	35	4	$1245	500 up
	35	4	1295	500 up
1921	35	4	1295	

Discontinued

STANDARD

Year	Model	Cyls.	Price	Serial Numbers
1916	E	8	$1850	175-519
			2100	
1917	F	8	2450	C100-599
1918	G	8	2750	600-1099
1919	H	8	2750	1100-1599
1920	I	8	3400	1600-3605
1921	J	8	3400	
1922	98	8	2500	10000 up

Number plate on dash; engine numbers on crankcase

STANLEY

Year	Model	Cyls.	Price	Serial Numbers
1915	720 & 721	2	$1975	15001-15999
1916	725, 726	2	2200	16001-16999
	727, 728			
1917	728 & 730	2	2200	17001-17999
1918	735 & 736	2	2800–3740	18001-18999
1920	735	2	4275	19001-19999
	735-A	2	4275	
	735-B	2	4275	19424-20251
	735-C	2	5975	
	735-D	2	5775	
1921	735	2	2600	21001 and up
1922	740	2	2700	22001-22115
				22201-22447

Number on name plate on chassis frame

STANWOOD SIX

Year	Model	Cyls.	Price	Serial Numbers
1921	6	6	$2050	
1922	6	6	1765	

STEARNS-KNIGHT

Year	Model	Cyls.	Price	Serial Numbers
1915	L-4	4	$1750	L1-L702
	Six	6	5000	9000-9109
1916	Four	4	1395	L703-L2800
	Eight	8	2050	10000-10900
1917	32	4	1450	L2801-L4800
	33	8	2150	10901-12000
1918	4	4	1785	4745-5900
	8	8	2575	12079-12350
1919	L-4	4	2250	L5901-L7102
	8	8	2700	12351-12404
1920	SKL4	4	2350	L-7103 up
1921	SKL4	4	2450	
1922	SKL4	4	2250	L-13400 up
	6	6	2700	

Number on first floor board near right side

STEPHENS

Year	Model	Cyls.	Price	Serial Numbers
1916	65	6	$1125	101-1100
1917	65	6	1250	
	75	6	1385	10001-13000
1918	80	6	2050	
1919	82 & 84	6	1975	
	83 & 85	6	3050	15001-20000
	86	6	2050	
1920	80	6	2050	
1921	90	6	1985	
1922	90	6	1595	30407-31118

Number plate on dash, right side, under hood

STEVENS-DURYEA

Year	Model	Cyls.	Price	Serial Numbers
1921	E	6	$9500	1001-1156
1922	E	6	6800	1100-1200

Number on engine frame at left front end

STUDEBAKER

Year	Model	Cyls.	Price	Serial Numbers
1915	SD	4	$985	423001-447419
	EC	6	1385	500001-617155
1916	SF	4	885	460001-474180
	ED	6	1050	630001-637260
1917	SF	4	940	474181-500369
				100000-109500
	ED	6	1180	637261-655270
				200000-207500
	SF	4	845	109501-133051
	ED	6	1050	207501-233495
1918	SH	4	895	133101 up
	EG	6	1695	290001 up
	EH	6	1295	233501 up
1919	SH	4	1225	133101-141951
	EG	6	1985	290001-300635
	EH	6	1585	233501-257389
1920	EH	6	1785	257465 to 290000
	EG-6	6	2150	315701 and up
	EH-6	6	....	504501 and up
	EJ-6	6	1485	1000001 and up

1913 numbers on front seat heel board
1914-15 numbers on front door pocket
1916-17 numbers inside dash
1918-19 numbers under left front fender on frame
1920 numbers on brass plate on rear motor support

1921	EJ	6	$1335	1000001 to 1035002
	EH	6	1635	515114 to 535876
	EG	6	1985	329129 to 335069
1922	EJ	6	1045	1000001-1035002
	EL	6	1475	3000001 up
	EK	6	1785	2000001 up

Numbers on right hand side of crankcase

STUTZ

Year	Model	Cyls.	Price	Serial Numbers
1915	HCS	4	$1475	Series F
	4-F	4	2275	
	6-F	6	2525	
1916	4-C	4	2300	Series C
1917	4-R	4	2550	Series R
1918	4-S	4	2750	Series S
1919	Data not available			
1920	H	4	$3100	5001 to 9002
1921	....	4	3350	
1922	DH	4	2990	12001-13129

Number on left side of dash

TEMPLAR

Year	Model	Cyls.	Price	Serial Numbers
1918	A-445	4	$2185	1-150
1919	A-445	4	2485	150 up
1920	A-445	4	2685	1200 to 2500
1921	A-445	4	2385	
1922	6-445	4	2125	3601-5300

Number plate on dash and right front motor support arm

TULSA

Year	Model	Cyls.	Price	Serial Numbers
1917	D	4	$1150	3000-3400
1918	D	4	1200	3000-3400
1919	D	4	1200	3000-3500
1920	E	4	1335	4000 up
1921	E 1-3	4	1385	
1922	....	4	1175	

Number on outside front end left hand side rail of frame

VELIE

Year	Model	Cyls.	Price	Serial Numbers
1915	11	4	$1500	32101-32500
	12	4	1750	(See 9)—19251
	14	6	2015	19301-19451
	15	6	1595	19500-20690
1916	22	6	1065	35000-39000
1917	27	6	1600	40000—(See 39)
	28	6	1185	50000—(See 38)
1918	38	6	1440	(See 28)—68506
	39	6	1695	(See 27)—40987
1919	38	6	1685	
	39	..	....	
	48	6	....	69001 up
1920	48	6	1985	70001 and up
	34	6	1585	110001 and up
1921	48	6	1885	70000 and up
	34	6	1485	110000 to 116550
1922	48	6	1585	69000-81300
	31	6	1235	110000-116550
	58	6	1395	120000 up

Number on name plate left side seat box. Also stamped into top side of frame at extreme right front end; engine number left side crankcase and left hand front motor leg.

WASHINGTON

Year	Model	Cyls.	Price	Serial Numbers
1922	C	6	$1785	1-125

Number on left hand side dash

WASP

Year	Model	Cyls.	Price	Serial Numbers
1920	201	4	....	2011 and up
1921	2611	4	$5500	

Number on instrument board
Discontinued

WESTCOTT

Year	Model	Cyls.	Price	Serial Numbers
1915	O-35	4	$1185	1103-1348
	U-50	6	1585	1500-1699
1916	41	6	1295	4001-4200
	42	6	1445	4201-5100
	51	6	1595	4599-5402
1917	17	6	1590	5501-6292

Number on dash plate

1918	S-18	6	$1890	6293-7200
	18-A	6	2290	7201-8088

WESTCOTT—Continued

Year	Model	Cyls.	Price	Serial Numbers
1919	A-48	6	$2590	8101-8904
	A-38	6	1775	10001-10402
	B-38	6	2390	11001-11801
1920	C-38	6	2390	13001 up
	C-48	6	2890	20001 up

Number plate on right side of engine on all cars after S-18

1921	C-48	6	$2990	20800-21050
	C-38	6	2290	13750-14550
1922	C-48	6	1890	20001 up
	A-44	6	1890	16001 up

Number on engine and on cowl under hood

WILLYS-KNIGHT

Year	Model	Cyls.	Price	Serial Numbers
1917	88-6	6	....	1-2500
1917-18-19	88-4	4	....	1 up
	88-8	8	....	1-2723
1920	88-4	4	$1725	

Number plate on right rear frame end; engine number of models 88-6 and 88-4 on plate on left side crankcase.

1921	20	4	$1895	12680-21708
1922	20	4	1375	21709 up

Number on metal plate at left hand side driver's seat

WILLS STE CLAIRE

Year	Model	Cyls.	Price	Serial Numbers
1921	A-68	8	$3200	1 to 1500
1922	A-68	8	2475	1551-1635

Number on plate in driver's compartment

WILLYS-SIX

Year	Model	Cyls.	Price	Serial Numbers
1917-18-19	80	6	....	1-12000

Number plate on right rear frame end
Discontinued

WINTHER

Year	Model	Cyls.	Price	Serial Numbers
1920	61	6	....	61001 and up
1921	61	6	$2750	

Number on left side front motor support cross bar
Discontinued

WINTON SIX

Year	Model	Cyls.	Price	Serial Numbers
1920	25	6	$4250	35675 to 35707
	25	6	....	155 to 2675
1921	25	6	4800	2676-2999
1922	40	6	3400	3000-3689

Number on left front leg of motor

JEWETT

Year	Model	Cyls.	Price	Serial Numbers
1922	Six	6	$1065	10000 up

Number on left side crankcase

STAR

Year	Model	Cyls.	Price	Serial Numbers
1922	....	4	$348	

As Star cars are numbered by manufacturing zones, it is best to obtain serial numbers from Durant Motor Co., Long Island City, N. Y.

Know the Motor Vehicle Laws of Your State

It is an excellent plan for every motor car dealer, salesman and maintenance man to become thoroughly acquainted with the laws regarding the operation of motor vehicles in their state.

While most persons who own or operate motor vehicles are more or less acquainted with the speed laws of their state not many of them are versed in the law when it comes to such things as engine and serial numbers.

The dealer, especially, should know what must be done when a car comes in with no engine number and such a car is to be sold.

As an example we quote below some of the laws applying to motor vehicles in Illinois. Other states have similar laws. Get acquainted with them.

Section 35. Person owning or offering for sale a motor vehicle with the original engine number destroyed or altered, or without an engine number, except electric vehicles, shall be deemed guilty of a misdemeanor. Fine of not less than $200.00 nor more than $500.00 or by imprisonment in the county jail for not less than 30 nor more than 180 days, or both. Second conviction of same offense shall be punishable by imprisonment in the penitentiary for not less than one nor more than five years.

Secretary of State may give permission to make or stamp a special engine number on the engines of motor vehicles which have none, provided application on proper blank, etc., is executed and accompanied by fee of $1.00. This number shall then become the lawful engine number.

Every sheriff, chief of police, etc., knowing of a motor vehicle the engine number of which has been destroyed or altered, shall seize and take possession of the motor vehicle and arrest the supposed owner and cause prosecution.

The court must hold the motor vehicle and in case supposed owner is found guilty, said motor vehicle shall be in the custody of the court until the fine and costs of prosecution are paid. When paid, the court shall return the vehicle to the supposed owner and he shall remove the engine from the said motor vehicle, tear the engine apart and dispose of the same for junk.

If costs are not paid within thirty days, the court shall advertise and sell the motor vehicle. The purchaser shall remove the engine from the vehicle, tear it apart, so that it can never be used as the engine in another motor vehicle.

Proceeds of sale shall be used to cover costs of prosecution, and if there is a balance it shall be given to the supposed owner.

If the true owner appears and proves the motor vehicle is his property, it shall be returned to him and the original engine number restored.

No motor vehicle can be registered without an engine number.

Buyer's Guide to 1924 Cars

Wherein MOTOR AGE *Presents the Price, Wheelbase and Number of Cylinders of All American Manufactured Gasoline Cars. The Cars Are Grouped According to Body Style and the General Arrangement of the Cars in Each Class Is from the Lowest to the Highest Priced in That Class. Complete Mechanical Specifications Follow*

Two and Three Passenger Roadsters

Name—Model	Price	Cyl.	Wheelbase
Ford—T	$ 265r	4	100
Ford—T	350	4	100
Chevrolet—Superior	490	4	103
Star	490	4	102
Overland—91	495	4	100
Gray	510	4	100
Oldsmobile—30	750	6	110
Maxwell	795	4	109
Dodge	850	4	116
Seneca—L-2 & O-2	875	4	108
Durant—A 22	890	4	109
Maxwell	895	4	109
Gardner—Series 5	895	4	112
Nash—41-S	915	4	112
Buick—1924	935	4	109
Oakland—6-54	945	6	113
Rollin	975	4	112
Studebaker—Light Six	975	6	112
Seneca—50c & 51c	985	4	112
Columbia—Light Six	995	6	115
Cleveland—42	1,085	6	112½
Oakland—6-54	1,095	6	113
Hupmobile—Series R	1,175	4	115
Willys-Knight—64	1,175	4	118
Jewett—Six	1,195	6	112
Hupmobile—Series R	1,195	4	115
Nash—691-3-6-7	1,240	6	121
Velie—58	1,275	6	118
Buick—1924	1,275	6	120
Flint	1,295	6	120
Davis—71	1,295	6	115
Moon—U6-40	1,295	6	115
Stephens—10	1,295	6	117
Studebaker—Special Six	1,325	6	119
Courier	1,395	6	116
Hanson—66	1,395	6	121
Earl—40	1,485	4	112
Chrysler—Six	1,525	6	.....
Velie—58	1,525	6	118
Paterson—23-6-52	1,550	6	120
Chandler—Six	1,595	6	123
King—LL	1,595	6	120
Richenbacker—B	1,635	6	117
Sayers Six—DP	1,645	6	118
Buick—1924	1,675	6	128
Haynes—60	1,695	6	121
Case—X	1,750	6	122
Jordan—MX	1,750	6	120
King—L	1,795	8	124
Lexington—23	1,895	6	123
American—D-66	1,950	6	127
Peerless—6	1,985	6	126
Haynes—77	1,995	6	132
Templar	1,995	6	122
Stutz—690	1,995	6	120
Kissel—55	2,085	6	121
Cole—Master	2,175	8	127¼
H C S—Series 4	2,250	4	120
Stearns-Knight—6	2,395	6	130
Stutz—KLDH	2,450	4	130
National—BB	2,475	6	130
McFarlan	2,500	6	127
Noma—40	2,500	6	128
Premier—6-D	2,535	6	126¾
Wills Ste Claire—A-68	2,575	8	121
Packard—126	2,585	6	126
Roamer—6-54 E	2,685	6	128
Stanley—740	2,750	2	130
Stutz—KLDH	2,765	4	130
Fox	2,975	6	132
Marmon—34	2,985	6	136
Cadillac—V-63	3,085	8	132
Winton—40	3,400	6	132
Roamer—4-75-E	3,685	4	128
Roamer	3,785	..	.....
Lincoln	3,800	8	136
Daniels—23-38	5,000	8	132
Lafayette	5,000	8	132
Pierce-Arrow	5,250	6	138
McFarlan—1923	5,400	6	140
Deusenberg—Straight 8	6,500	8	134
Locomobile—Series 8	8,600	6	142
Rolls Royce—40-50	11,400	6	143½

Two and Three Passenger Closed Cars

Name—Model	Price	Cyl.	Wheelbase
Ford—T	$ 525	4	100
Chevrolet—Superior	640	4	103
Star	640	4	102
Gray	685	4	100
Gray	735	4	104
Overland—91	750	4	100
Maxwell	935	4	109
Oldsmobile—30	955	6	110
Dodge—4	1,035	4	116
Gardner—Series 5	1,145	4	112
Hupmobile—Series R	1,145	4	115
Rollin	1,175	4	112
Oakland—6-54	1,195	6	113
Studebaker—Light Six	1,195	6	112
Cleveland—42	1,245	6	112½
Cleveland—42	1,345	6	112½
Durant—A-22	1,365	4	109
Columbia—Light Six	1,395	6	115
Anderson—41	1,425	6	115
Buick—1924	1,495	4	109
Courier	1,495	6	116
Westcott—44	1,795	6	120
Hatfield—A-42	1,950	4	115
Rickenbacher—B	2,035	6	117
Elgin	2,145	6	118
Westcott—50	2,190	6	.....
Pilot—6-56	2,445	6	126
Templar	2,495	6	122
King—L	2,500	8	124
McFarlan	3,000	6	127
Stearns-Knight—6	3,150p	6	130
Stutz—KLDH	3,250	4	130
Roamer—6-54-E	3,285	6	128
Peerless—66	3,300	8	128
Stearns-Knight—6	3,395	6	130
Cadillac—V-63	3,875	8	132
Fox	3,975	6	132
Lincoln	5,200	8	136
McFarlan—1923	6,720	6	140
Pierce-Arrow	6,800	6	138

Four and Five Passenger Phaetons

Name—Model	Price	Cyl.	Wheelbase
Ford—T	$ 295s	4	100
Ford—T	380	4	100
Star	490	4	102
Chevrolet—Superior	495	4	103
Overland—91	495	4	100
Gray	520	4	100
Gray	625	4	100
Gray	630	4	100
Star	640	4	102
Overland—92	695	4	106
Gray	720	4	104
Oldsmobile—30	750	6	110
Maxwell	795	4	109
Eagle—6	820	6	118
Essex	850	6	110½
Seneca—L-2 & O-2	875	4	108
Dodge	880	4	116
Oldsmobile—30	885	6	110
Durant—A-22	890	4	109
Gardner—Series 5	895	4	112
Rollin	895	4	112
Nash—41-8	935	4	112
Oakland—6-54	945	6	113
Buick—1924	965	4	109
Maxwell	975	4	109
Seneca—50c & 51c	985	4	112
Elcar—4-40	995	4	112
Moon	995	6	130
Studebaker—Light Six	995	6	112
Gardner—Series 5	995	4	112
Columbia—Light Six	995	6	115
Cleveland—42	1,045	6	112½
Dodge	1,045	4	116
Durant—A-22	1,065	4	109
Jewett—Six	1,065	6	112
Auburn—6-43	1,095	6	114
Dort—27	1,095	6	115
Oakland—6-54	1,095	6	113
Earl—40	1,095	4	112
Velie—58	1,095	6	118
Kelsey—G	1,150	4	112
Hupmobile—Series R	1,175	4	115
Willys-Knight—64	1,175	4	118
Chalmers—1923	1,185	6	117
Anderson—41	1,195	6	115
Columbia—Light Six	1,195	6	115
Elcar—4-40	1,195	4	112
Hupmobile—Series R	1,195	4	115
Nash—41-8	1,195	4	112
Jewett—Six	1,220	6	112
Nash—691-3-6-7	1,240	6	121
Dort—27	1,245	6	115
Earl—40	1,275	4	112
Velie—58	1,275	6	118
Flint	1,295	6	120
Flint	1,295	6	120
Buick—1924	1,295	6	120
Moon—US-40	1,295	6	115
Stephens—10	1,295	6	117
Cleveland—42	1,295	6	112½
Courier	1,295	6	116
Haynes—60	1,295	6	121
Chrysler—6	1,335	6	.....
Reo—T-6	1,335	6	120
Chalmers—1923	1,335	6	117
Hudson—Super Six	1,345	6	126
Hatfield—A-42	1,345	4	115
Hatfield—A-42	1,345	4	115
Studebaker—Special Six	1,350	6	119
Auburn—6-43	1,365	6	114
Paterson—23-6-52	1,390	6	120
Apperson—6	1,395	6	120
Barley—Six	1,395	6	118
Chrysler—Six	1,395	6	.....
Elcar—6-60	1,395	6	118
Lexington—Concord	1,395	6	119
Hanson—66	1,395	6	121
Haynes—77	1,395	6	132
Anderson—41	1,445	6	115
Paterson—23-6-52	1,465	6	120
Columbia—Big Six	1,475	6	115
Chandler—Six	1,485	6	123
Barley—Six	1,495	6	118
Davis—71	1,495	6	115
Hanson—66	1,495	6	121
Moon—U6-40	1,495	6	115
Davis—71	1,495	6	115
Reo—T-6	1,545	6	120
Velie—58	1,565	6	118
Kissel—55	1,585	6	121
Rickenbacker—B	1,585	6	117
Westcott—44	1,590	6	120
King—LL	1,595	8	120
King—LL	1,595	8	120
Courier	1,595	6	116
Elcar—6-60	1,595	6	118
Willys-Knight—64	1,635	4	118

Sayers Six—DP	1,645	6	118
Nash—691-3-6-7	1,645	6	121
Jordan—MX	1,675	6	120
Chandler—Six	1,685	6	123
Westcott—50	1,690	6	.....
Westcott—44	1,690	6	120
American—D66	1,695	6	127
Auburn—6-63	1,695	6	124
Pilot—6-56	1,695	6	126
Buick—1924	1,725	6	128
Pilot—6-56	1,745	6	126
Stephens—20	1,750	6	124
Haynes—60	1,750	6	121
Stearns-Knight—SKL 4	1,750	4	125
Stearns-Knight—SKL 4	1,750	4	125
Hatfield—6-55	1,775	6	121
Washington—6	1,785	6	116
Chandler—Six	1,785	6	123
Case—X	1,790	6	123
King—L	1,795	8	124
Studebaker—Big Six	1,835	6	126
Westcott—50	1,840	6	.....
Stephens—20	1,850	6	124
American—D-66	1,850	6	127
King—LL	1,895	8	120
Lexington—23	1,895	6	123
Templar	1,895	6	122
Auburn—6-63	1,935	6	124
Franklin—10-B	1,950	6	115
Sterling Knight	1,985	6	125
Kissel—55	1,985	6	121
Peerless—6	1,985	6	126
Jordan—H & L	1,995	6	124½
King—L	1,995	8	124
Stutz—690	1,995	6	120
Lexington—23	2,145	6	123
Haynes—77	2,150	6	132
Moon—6-58	2,150	6	128
Cole—Master	2,175	8	127¼
Lexington—23	2,195	6	123
Sterling Knight	2,200	6	125
Case—X	2,230	6	122
H C S—Series 4	2,250	4	120
R & V Knight—H	2,300	6	124
Stutz—690	2,315	6	120
Stearns-Knight—6	2,395	6	130
R & V Knight—H	2,400	6	124
Paige—6-70	2,450	6	131
Cole—Master	2,475	8	127¼
National—BB	2,475	6	130
Wills Ste Claire	2,475	8	121
Apperson—8-23-S	2,485	8	130
National—BB	2,485	6	130
Roamer—6-54-E	2,485	6	128
McFarlan	2,500	6	127
Noma—4-C	2,500	6	128
Packard—126	2,585	6	126
Premier—6-D	2,585	6	126¾
Premier—6-D	2,585	6	126¾
Noma—4-C	2,600	6	128
Premier—6-D	2,635	6	126¾
Stutz—Speedway	2,650	6	130
H C S—Series 6	2,650	6	126
Peerless—66	2,690	8	128
Packard—126	2,750	6	126
Roamer—6-54-E	2,750	6	128
Stanley—740	2,750	2	130
Marmon—34	2,785	6	136
Stutz—KLDH	2,790	4	130
Wills Ste Claire—A-68	2,875	8	127
Fox	2,975	6	132
Marmon—34	2,985	6	136
Cadillac—V-63	3,085	8	132
Crawford—23-6-70	3,100	6	138
Stutz—KLDH	3,115	4	130
Revere—M	3,200	4	131
Revere—M	3,200	4	131
Revere—M	3,200	4	131
Roamer—4-75-E	3,485	4	128
Crawford-Dagmar—6-70	3,500	6	138
Winton—40	3,600	6	132
Packard—"Eight" 136	3,650	8	136
Roamer—4-75-E	3,650	4	128
Lincoln	3,800	8	136
Packard—8	3,850	8	136
Dorris—6-80	3,950	6	136
Dorris—6-80	4,150	6	136
Daniels—23-28	4,650	8	132
Daniels—23-28	5,000	8	138
Lafayette	5,000	8	132
Pierce-Arrow	5,250	6	138
McFarlan—1923	5,600	6	140
Cunningham—V-4	5,800	8	142
Duesenberg—Straight 8	6,250	8	134
Duesenberg—Straight 8	6,500	8	134
Locomobile—Series 8	7,900	6	142
Rolls Royce—40-50	10,900	6	143½

Four and Five Passenger Closed Cars

Name—Model	Price	Cyl.	Wheel-base
Ford—T	$ 590	4	100
Ford—T	685	4	100
Overland—91	695	4	100
Chevrolet—Superior	725	4	103
Star	785	4	102
Gray	785	4	104
Chevrolet—Superior	795	4	103
Overland—91	795	4	100
Gray	835	4	100
Star	935p	4	102
Essex—4	975	6	110½
Oldsmobile—30	1,033	6	110
Maxwell	1,045	4	109
Oldsmobile—30	1,095	6	110
Maxwell	1,195	4	109
Dodge	1,250	4	116
Rollin	1,275	4	112
Nash—41-8	1,275	4	112
Cleveland—42	1,295	6	112½
Maxwell	1,295	4	109
Oakland—6-54	1,345	6	113
Cleveland—42	1,395	6	112½
Durant—A-22	1,365	4	109
Dodge	1,385	4	116
Buick—1924	1,395	4	109
Studebaker—Light Six	1,395	6	112
Oakland—6-54	1,395	6	113
Earl—40	1,395	4	112
Hupmobile—Series R	1,425	4	115
Gardner—Series 5	1,445	4	112
Cleveland—42	1,445	6	112½
Nash—41-8	1,445	4	112
Willys-Knight—64	1,450	4	118
Kelsey—G	1,450	4	112
Durant—A-22	1,465	4	109
Hudson—Super Six	1,475	6	126
Velie—58	1,485	6	118
Studebaker—Light Six	1,485	6	112
Anderson—41	1,495	6	115
Buick—1924	1,495	4	109
Cleveland—42	1,495	6	112½
Columbia—Light Six	1,495	6	115
Jewett—Six	1,495	6	112
Chalmers—1923	1,535	6	117
Dodge	1,535	4	116
Dort—27	1,535	6	115
Dodge	1,545	4	116
Velie—58	1,545	6	118
Willys-Knight—64	1,550	4	118
Maxwell	1,585	4	109
Auburn—6-43	1,595	6	114
Davis—71	1,595	6	115
Dort—27	1,595	6	115
Earl—40	1,595	4	112
Hupmobile—Series R	1,595	4	115
Stephens—10	1,595	6	117
Elcar—4-40	1,625p	4	112
Chrysler—Six	1,625	6	.....
Nash—691-3-6-7	1,640	6	121
Columbia—Light Six	1,650	6	115
Moon—U 6-40	1,685	6	115
Barley	1,685	6	118
Anderson—41	1,695	6	115
Auburn—6-43	1,695	6	114
Buick—1924	1,695	6	120
Jewett—Six	1,695p	6	112
Moon—U6-40	1,695	6	115
Chandler—Six	1,745	6	123
Hupmobile—Series R	1,750	4	115
Davis—71	1,795	6	115
Willys-Knight—64	1,795	4	118
Lexington—Concord	1,845	6	119
Haynes—60	1,845	6	121
Auburn—6-43	1,845	6	114
Barley—Six	1,850	6	118
Reo—T6	1,875	6	120
Nash—692-4-5-8	1,890	6	127
Chrysler—Six	1,895	6	.....
Flint	1,895	6	120
Haynes—60	1,895	6	121
Hudson—Super Six	1,895	6	126
Anderson—41	1,895p	6	115
Moon—U6-40	1,895	6	115
Chandler—Six	1,895	6	123
Velie—58	1,895	6	118
Studebaker—Special Six	1,895	6	119
Willys-Knight—64	1,895p	4	118
Buick—1924	1,945	6	128
Hatfield—A-42	1,950	4	115
Studebaker—Special Six	1,985	6	119
Reo—T6	1,985	6	120
Studebaker—Special Six	1,985	6	119
Buick—1924	1,995	6	120
Columbia—Big Six	1,995	6	115
Stearns-Knight—SKL4	1,995p	4	125
Elcar—6-60	1,995	6	118
King—LL	1,995	8	120
Stephens—10	1,995	6	117
Apperson—6	1,995	6	120
Flint	2,085	6	120
Nash—691-3-6-7	2,090	6	121
Nash—691-3-6-7	2,090c	6	121
Buick—1924	2,095	6	120
Velie—58	2,095p	6	118
Rickenbacker—B	2,135	6	117
Hatfield—6-55	2,175	6	121
Courier	2,195p	6	116
Elcar—6-60	2,195p	6	118
Hanson—66	2,195	6	121
King—LL	2,200	8	120
Barley—Six	2,250p	6	118
Franklin—10-B	2,250	6	115
Chandler—Six	2,270	6	123
Jordan—MX	2,285	6	120
Westcott—50	2,290	6	.....
Haynes—60	2,295d	6	121
Lexington—23	2,295	6	123
King—L	2,295	8	124
Elgin	2,345	6	118
American—D66	2,350	6	127
Stearns-Knight—SKL 4	2,350	4	125
Hatfield—6-55	2,350	6	121
Buick—1924	2,385	6	128
Peterson—23-6-52	2,395	6	120
Peterson—23-6-52	2,395	6	120
Kissel—55	2,485	6	121
Westcott—44	2,490	6	120
Haynes—60	2,495	6	121
Studebaker—Big Six	2,495	6	126
American—D66	2,550	6	127
Stutz—690	2,550	6	120
Case—X	2,575	6	122
Jordan—H & L	2,585	6	124½
Moon—6-58	2,585	6	128
Templar	2,595	6	.....
Sayers Six—DP	2,645	6	118
Sayers Six—DP	2,645	6	122
Peerless—Six	2,675	6	126
Lexington—23	2,695	6	123
Sterling-Knight	2,750p	6	125
Cole—Master	2,750	8	127¼
Franklin—10-B	2,750	6	115
Sterling-Knight	2,800	6	125
Franklin—10-B	2,850	6	115
McFarlan	3,000	6	127
R & V Knight—H	3,000	6	124
R & V Knight—H	3,050	6	124
Cole—Master	3,075	8	127¼
Paige—6-70	3,235	6	131
National—BB	3,250	6	130
Packard—126	3,275	6	126
Wills Ste Claire—A-68	3,275	8	121
Stutz—Speedway	3,350	6	130
H. C. S.—Series 6	3,350	6	126
Packard—126	3,375	6	126
Apperson—8-23-S	3,385	8	130
Premier—6-D	3,385	6	126¾
Peerless—66	3,390	8	128
Stearns-Knight—6	3,395	6	130
Stutz—KLDH	3,490	4	130
Noma—D C	3,500	6	128
Wills Ste Claire—A-68	3,575	6	121
Marmon—34	3,585	6	136
Roamer—6-54-E	3,585	6	128
Roamer—6-54-E	3,585	6	128
Stanley—740	3,585	2	130
Peerless—66	3,690	8	128
National—BB	3,725	6	130
Cadillac—V-63	3,950	8	132
Fox	3,975	6	132
Marmon—34	3,985	6	136
Revere—M	4,000	6	120
Cadillac—V-63	4,150	8	132
Winton—40	4,250	6	132
Roamer—6-54-E	4,250p	6	138
Lincoln	4,400	8	136
Winton—40	4,450p	6	132
Crawford-Dagmar—6-70	4,500	6	138
Packard—"Eight"	4,550	8	136
Lincoln	4,600	8	136
Roamer—4-75-E	4,650p	4	128
Lincoln	4,700	8	136
Packard—"Eight" 136	4,725	8	136
Dorris—6-80	4,985	6	136
Rubay	5,100	4	118
Rubay	5,250	4	118

Name—Model	Price	Cyl.	Wheel-base
Dorris—6-80	5,550	6	136
Daniels—23-38	5,600	8	132
Daniels—23-28	6,000	8	138
Lafayette	6,300	8	132
Daniels—23-38	6,350	8	132
Daniels—23-38	6,600	8	138
McFarlan—1923	6,600	6	140
McFarlan—1923	6,720	6	140
Pierce-Arrow	6,900	6	138
Duesenberg—Straight 8	7,500	8	134
Cunningham—V4	7,650	8	142
Locomobile—Series 8	11,750	6	142
Locomobile—Series 8	12,200	6	142
Rolls Royce—40-50	12,800	6	143½
Rolls Royce—40-50	13,500	6	143½

Six and Seven Passenger Phaetons

Chalmers—1923	$1,295	6	122
Willys-Knight—67	1,325	4	124
Nash—692-2-5-8	1,390	6	127
Hudson—Super 6	1,425	6	126
Paterson—23-6-52	1,425	6	120
Buick—1924	1,565	6	128
Anderson—50	1,595	6	122
Stephens—20	1,595	6	124
Chandler—Six	1,635	6	123
Pilot—6-56	1,745	6	126
Studebaker—Big Six	1,750	6	126
American—D-66	1,760	6	127
Moon—6-58	1,785	6	128
King—L	1,795	8	124
Westcott—48	1,990	6	125
Lexington—23	1,995	6	123
Haynes—77	1,995	6	132
Cole—Master	2,175	8	127¼
Westcott—48	2,190	6	125
Haynes—77	2,250	6	132
Lexington—23	2,295	6	123
R & V Knight—H	2,350	6	124
National—BB	2,375	6	130
Paige—6-70	2,450	6	131
Case—Y	2,475	6	132
Apperson—8-23-8	2,485	8	130
Stearns-Knight—6	2,495	6	130
Stutz—KLDH	2,640	4	130
Stutz—Speedway	2,685	6	130
Roamer—6-54-E	2,685	6	128
Peerless—66	2,750	8	128
Stanley—740	2,750	2	130
Packard—133	2,785	6	133
Marmon—34	2,785	6	136
Wills Ste Claire—A-68	2,875	8	127
Cadillac—V-63	3,085	8	132
Crawford—23-6-70	3,100	6	138
National—BB	3,150	6	130
Winton—40	3,400	6	132
Lincoln	3,800	8	136
Roamer—4-75-E	3,800	4	128
Packard—143	3,850	8	143
Dorris—6-80	3,950	6	136
Daniels—23-38	4,700	8	132
Daniels—23-28	4,800	8	132
Lafayette	5,000	8	132
Daniels—23-28	5,150	8	138
Pierce	5,250	6	138
McFarlan—1923	5,700	6	140
Cunningham—V4	6,300	8	142
Duesenberg—Straight 8	6,750	8	134
Locomobile—Series 8	7,900	6	142
Rolls Royce—40-50	11,450	6	143½

Six and Seven Passenger Closed Cars

Willys-Knight—67	$1,995	4	124
Nash—691-3-6-7	2,040	6	121
Westcott—50	2,090	6	.....
Chalmers—1923	2,095	6	122
Chandler—Six	2,095	6	123
Nash—692-4-5-8	2,190	6	127
Stephens—20	2,250	6	124
Studebaker—Big Six	2,285	6	126
Buick—1924	2,285	6	128
Chandler—Six	2,385	6	123
King—LL	2,400	8	120
Auburn—6-63	2,445	6	124
Moon—6-58	2,485	6	128
King—L	2,625	8	124
Jordan—H & L	2,785	6	124½
Haynes—77	2,795	6	132
Haynes—77	2,995	6	132
Paige—6-70	3,235	6	131
R & V Knight—H	3,250	6	124
National—BB	3,285	6	130
Case—Y	3,325	6	132
Apperson—8-23-8	3,385	8	130
Stearns-Knight—6	3,395	6	130
Packard—126	3,450	6	126
Wills Ste Claire—A-68	3,475	8	121
Stutz—Speedway	3,500	6	130
Cadillac—V-63	3,585	8	132
Premier—6-D	3,585	6	126¾
Stutz—Speedway	3,600	6	130
Packard—133	3,625	6	133
Packard—133	3,675	6	133
Peerless—66	3,840	8	128
Roamer—6-54-E	3,950	6	128
Marmon—34	3,985	6	136
Stanley—740	3,985	2	130
Crawford—26-3-70	4,500	6	138
Winton—40	4,550	6	132
Lincoln	4,900	8	136
Packard—"Eight" 143	4,900	8	143
Rubay	5,200	4	118
Rubay	5,250	4	118
Dorris—6-80	5,800	6	136
Daniels—23-38	6,450	8	132
Lafayette	6,500	8	132
Daniels—23-38	6,800	8	138
McFarlan—1923	6,810	6	140
Pierce-Arrow	7,000	6	138
Pierce-Arrow	7,000	6	138
Straight 8	7,800	8	134
Locomobile—Series 8	11,600	6	142
Locomobile—Series 8	12,200	6	142
Rolls Royce—40-50	12,850	6	143½
Rolls Royce—40-50	12,900	6	143½

Broughams

Elcar—4-40	$1,265	4	112
Jewett—Six	1,325	6	112
Gardner—Series 5	1,335	4	112
Dort—27	1,535	6	115
Chrysler—Six	1,795	6	.....
Haynes—60	1,795	6	121
Courier	1,895	6	116
Velie—58	1,945	6	118
Elcar—6-60	1,995	6	118
American—D 66	2,195	6	127
Stearns-Knight—SKL 4	2,195	4	125
Buick—1924	2,235	6	128
Reo—T 6	2,235	6	120
Auburn—6-63	2,245	6	124
Jordan—MX	2,285	6	120
Lexington—23	2,395	6	123
Westcott—44	2,490	6	120
Pilot—6-56	2,495	6	126
Kissel—55	2,585	6	121
Buick—1924	2,795	6	128
Paige—6-70	2,850	6	131
Franklin—10-B	2,850	6	115
Haynes—77	2,850	6	132
Elgin	3,000	6	118
Cole—Master	3,075	8	127¼
Stearns-Knight—6	3,200	6	130
Roamer—6-54-E	4,000	6	128
Pierce-Arrow	6,800	6	138
Duesenberg—Straight 8	7,800	8	134

Limousines

Buick—6	$2,385	6	128
Franklin—10-B	2,950	6	115
Chandler—Six	2,995	6	123
Paige—6-70	3,435	6	131
Wills Ste Claire—A-68	3,850	8	121
Roamer—6-54-E	3,950	6	138
Peerless—66	4,090	8	128
Marmon—34	4,285	6	136
Cadillac—V 63	4,600	8	132
Packard—"Eight" 136	4,700	8	136
Winton—40	4,700	6	132
Packard—"Eight" 143	4,950	8	143
Lincoln	5,100	8	136
McFarlan—1923	6,900	6	140

Abbreviations:

P—Sport model.

R—Price without starter and demountable rims.

S—Price without started and demountable rims.

Something About Next Week's Issue

Next week's issue of MOTOR AGE will be devoted chiefly to the Chicago automobile show. The issue will be of particular value in that it will tell exactly how many models of cars are included in the 1924 line of every American maker. This will make it possible for a dealer to refer quickly to any make of car and see what is contained in that particular line. Mention also will be made of the features of construction or a certain body type which characterizes each line.

Current Passenger Car Prices

(This list comprises cars distributed on a national basis)

NAME AND MODEL	PRICES: OPEN MODELS 2-3 Pass.	OPEN MODELS 4-5 Pass.	OPEN MODELS 6-7 Pass.	Sport Models	CLOSED MODELS 2-3 Pass.	CLOSED MODELS 4-5 Pass.	CLOSED MODELS 6-7 Pass.	Wheel Base (Ins.)	Tire Size (Ins.)††
American.....D-66	$1950	$1695	$1760	$1850d	d2195‡	$2350	$2550d	127	33x4½
Anderson.....41	.....	1195	.....	1445e	1425	[1495	d1895p	115	32x4*
						[1695			
Anderson.....50	.....	.....	1595	.....	.....	.....	.....	122	32x4*
Apperson.....6	.....	1395	.....	.....	.....	1995	.....	120	32x4*
Apperson.....8-23-S	.....	2485	2485	.....	.....	3385	3385	130	33x5
Auburn.....6-43	.....	1095	.....	1365d	1695d	1595	1845d	114	31x4*
Auburn.....6-63	.....	1695	.....	1935d	.....	2245‡	2445	124	32x4½*
Barley.....6-50	.....	1395	.....	1495d	1685d	[1850	.....	118	32x4
						[2250p			
Buick.....1924	935	965	.....	800g	1395e	1495	.....	109	31x4
Buick.....1924	1275	1295	.....	1135g	1995e	[1695	.....	120	32x4
						[2095			
Buick.....1924	1385g	.....	1565	[1675a	1945e	[2295‡	[2285	128	32x4½
				[1725d		[2385d	[2795‡		
Cadillac.....V 63	3085	3085	3085	.....	3875	3950	3585	132	33x5
						[4150	[4600§		
Case.....X	1750	1790	.....	2230d	2480e	2575	.....	122	32x4½
Case.....Y	.....	.....	2475	.....	.....	.....	3325	132	33x5
Chalmers.....1923	.....	1185	.....	1335d	.....	1535	.....	117	32x4
Chalmers.....1923	.....	.....	1295	.....	.....	.....	2095	122	32x4
Chandler.....Six	1595	[1485	1635	1785e	[1895d	[1745	[2385	123	32x4*
		[1685			[2095f	[2270	[2095§		
Chevrolet....Superior	490	495	395g	.....	610	795	725e	103	30x3½
Chrysler.....Six	1525	1335	1395d	.....	d1795‡	1625	1895d	.....	29x4½
Cleveland.....42	1085	1015	.....	[1145d	[1245	[1295	[1495d	112½	31x4*
				[1295d	[1345	[1395	[1445d		
Cole.....Master	2175	2175	2175	2475	2750e	3075	d3075‡	127¼	33x5*
Columbia.....Big Six	.....	1475	.....	.....	.....	1995	.....	115	32x4*
Columbia....Light Six	995	995	.....	1195d	1395	1495	1650d	115	31x4*
Courier.....	1395p	1295	.....	1595e	1495	2195p	1895‡	116	32x4
Crawford.....23-6-70	.....	3100	31 0	.....	.....	.....	4500	138	33x4½
Crawf'rd-Dagmar.6-70	.....	.....	.....	3500e	.....	4500	.....	138	33x5
Cunningham.....V4	.....	5800	6300	.....	.....	7650	.....	142	33x5
Daniels.....23-38	5000	4650	[4700	4650e	.....	[6350	6450	132	33x5
			[4800			[5600			
Daniels.....23-38	.....	5000	5150	.....	6000e	6600	6800	138	33x5
Davis.....71	1295	1495	.....	1495e	.....	1595	1795e	115	31x4*
Davis.....81	.....	.....	.....	.....	.....	.....	.....	118	...*
Dodge Brothers.....	850	880	.....	1045d	1035	[1250	[1545d	116	32x4*
						[1385	[1535e		
Dorris.....6-80	.....	3950	3950	1150e	4985e	5550	5800	136	32x6
Dort.....27	.....	1095	.....	1245e	1535d	1595	d1535‡	115	31x4*
Duesenberg.Straight 8	6500	6250	6750	6500e	d7800‡	7500	7800	134	33x5
Durant.....A-22	890	850	.....	1065d	1365	[1365	.....	109	31x4
						[1465			
Eagle.....6	.....	820	.....	.....	.....	.....	.....	118	.....
Earl.....40	1485	1095	.....	1275d	1395e	1595	.....	112	32x4
Elcar.....4-40	.....	995	.....	1195d	.....	1265‡	p1625d	112	31x4*
Elcar.....6-60	.....	1395	.....	1595d	[1995d	1995	p2195d	118	32x4*
Elgin.....	.....	1895	.....	.....	2145	2315	d3000‡	118	32x4½*
Essex.....	.....	850	.....	.....	.....	975	.....	110½	31x3½
Flint.....	1295	1295	.....	1295	1895e	2095	.....	120	32x4½*
Ford.....T	265r	295s	230g	.....	525	685	590d	100	30x3½
Fox.....Air-Cooled	2975	2975	...	.....	3975	3975	.....	132	32x4½
Franklin.....10-B	.....	1950	.....	.....	[2750e	[2250	§2950d	115	32x4½*
					[2850f	[2850			
Gardner.....Series 5	895	895	995d	1095	1145	1415	‡1335d	112	32x4
Gray.....	510	520	.....	625d	685	835	.....	100	30x3½
Gray.....	.....	630	.....	720d	735	875	.....	104	30x3½
H.C.S.....Series 4	2250	2250	.....	.....	.....	.....	.....	120	32x4½
H.C.S.....Series 6	...	2650	.....	.....	.....	3350	.....	126	32x4½*
Hanson.....66	1395	1395	.....	1495e	.....	2195	.....	121	32x4
Hatfield.....A-42	.....	1345	1345e	.....	1950	1950	.....	115	32x4
Hatfield.....6-55	.....	1775	.....	.....	2175e	2350	.....	121	32x4
Haynes.....77	1995	.....	[1995	2150	[2695‡	.....	[2795	132	33x5
			[2250		[2850f		[2995		
Haynes.....60	.....	[1295	.....	[1695b	d1795‡	[1845	[2295d	121	32x4½
		[1395		[1750d		[1895	[2495d		
Hudson.....Super 6	.....	1345	1425	.....	1475d	1895	.....	126	34x4½
Hupmobile...Series R	1175	1175	.....	[1195a	[1445	[1750	.....	115	32x4
				[1195d	[1425d	[1595			
Jewett.....Six	1195	1065	960g	1220d	‡1325d	[1495	.....	112	31x4*
					.....	[1695p			
Jordan.....MX	1750	1675	.....	.....	2285e	2285‡	.....	120	32x4*
Jordan.....H&L	.....	1995	.....	.....	.....	2585	2785	124½	32x4½*
Kelsey.....G	.....	.....	.....	1150d	.....	1450	.....	112	32x4
King.....LL	1595	1595	1595e	1895e	2200e	1995	2400	120	32x4½
King.....L	1795	1795	1795e	1995e	2500	2295	2625	124	32x4½
Kissel.....55	2085	1585	.....	1985e	2485e	2585‡	.....	121	32x4*

NAME AND MODEL	PRICES: OPEN MODELS 2-3 Pass.	OPEN MODELS 4-5 Pass.	OPEN MODELS 6-7 Pass.	Sport Models	CLOSED MODELS 2-3 Pass.	CLOSED MODELS 4-5 Pass.	CLOSED MODELS 6-7 Pass.	Wheel Base (Ins.)	Tire Size (Ins.)††
LaFayette.....	5000	5000	5000	4200g	.....	6300	6500	132	33x5*
Lexington....Concord	.....	1395	.....	.....	.....	1845	.....	119	32x4*
Lexington.....23	1895	[1895	[1995	2145d	2395‡	[2235	.....	123	32x4½*
		[2195	[2295			[2695			
Liberty.....10-D	.....	.....	.....	.....	.....	.....	.....	117	32x4
Lincoln.....	3800	3800e	3800	.....	[4600e	[4400	[4900	136	33x5*
					[5200	[4700	[5100§		
Locomobile.Series 8..	8690	7900	7900	.....	.....	[11750	[11600	142	35x5
						[12200	[12200		
Marmon.....34	2300g	2785	2785	[2985a	.....	[3585	[4285§	136	32x4½*
				[2985e		[3985	[3985		
Maxwell.....	795	795	.....	[895b	935	[1195	[1585d	109	31x4
				[975d		[1295	[1045d		
McFarlan.....	2500	2500	.....	.....	3000	3000	.....	127	32x4½
McFarlan.....1923	5400	5600	5700	.....	6720	[6600	[6810	140	33x5
						[6720	[6900§		
Moon.....U5-40	1295	1295	.....	1495d	1685e	[1695	.....	115	31x4*
						[1895			
Moon.....6-58	.....	.....	1785	2150	.....	2535	2485	128	32x4½*
Moon.....	.....	995	.....	.....	.....	.....	.....	130	...*
Nash.....691-3-6-7	1240	1240	1050g	1615e	2090e	[1640	2040	121	33x4
						[2090			
Nash.....692-4-5-8	.....	.....	1390	.....	.....	1890	2190	127	34x4½
Nash.....41-8	915	935	.....	1195d	.....	[1145	.....	112	33x4
						[1275			
National.....BB	2175	2475e	[2375	2485d	.....	[3250	3285	130	32x4½
			[3150			[3725			
Noma.....4C	2500	2500e	[600e		.....	3500	.....	128	33x5
Oakland.....6-54	945	915	.....	[1095a	1195	[1345	.....	113	31x4
				[1095d		[1395			
Oldsmobile 30	750	750	.....	885d	955	[1035	.....	110	31x4
						[1095			
Overland.....91	495	495	.....	395g	750	795	695d	100	30x3½
Overland.....92	.....	695	.....	.....	.....	.....	.....	106	30x3½
Packard.....126	2585	2585	2350g	2750e	3275e	3375	3450	126	33x4½
Packard.....133	.....	.....	2785	2450	.....	3625f	3675f	133	33x4½
Packard "Eight"...136	3850e	3650	.....	.....	4550e	4725	d4700§	136	33x5
Packard "Eight"...143	.....	.....	3850	.....	.....	4900f	4950§	143	33x5
Paige.....6-70	.....	2450	2450	.....	.....	[3235	[3235	131	33x4½*
						[2850f	[3435§		
Paterson.....23-6-52	1550	1390	1425	1465d	2295d	2395	.....	120	32x4½
Peerless.....Six	1985	1985	.....	.....	.....	2675	.....	126	32x4
Peerless.....66	...	2690	2750	2265	3300	[3390	[3840	128	33x5*
						[3690	[4090§		
Pierce-Arrow.....	5250	5250	5250	...	6800	[6900	[6800	138	33x5
						[7000f	[7000		
Pilot.....6-56	.....	1695	1745	1715	2115	2195‡	.....	126	32x4½
Premier.....6-D	2535	2585	2585d	2635d	.....	3335	3585	126‡	32x4½*
R & V Knight.....H	.....	2300	2350	2400e	3000d	3050	3250	124	32x4½
Reo.....T6	.....	1335	.....	1545d	.....	[1875	d2235‡	120	32x4*
						[1985			
Revere.....M	3200e	3200	.....	3200e	.....	4000	.....	131	32x4½
Rickenbacker.....B	1635	1585	.....	.....	2035	2135	.....	117	32x4*
Roamer.....6-54-E	2685	2485	2685	2750e	3285	[3585	[3585d	128	32x4½
						[3950§	[4000f		
Roamer.....6-54-E	.....	.....	.....	.....	.....	4250p	3950	138	32x4½
Roamer.....4-75-E	[3685	3485	3800	3650e	.....	4650p	.....	128	32x4½
	[3785								
Rollin.....	.....	895	.....	975	1175	1275	.....	112	31x5¼
Rolls-Royce.....40-50	11400	10900	11450	.....	.....	[12800	[12850	143½	33x5
						[13500	[12900		
Rubay.....	.....	.....	.....	.....	.....	[5100	[5200	118	32x4
						[5250	[5250		
Sayers Six.....DP	1615	1615	.....	.....	2615d	2645	.....	118	33x4
Seneca.....L-2 & O-2	875	875	.....	.....	.....	.....	.....	108	30x3½
Seneca.....50c & 51c	985	985	.....	.....	.....	.....	.....	112	31x4
Stanley.....740	2750	2750	2750	2425g	.....	3585	3985	120	32x4½
Star.....	490	490	.....	610d	610	785	p935d	102	30x3½
Stearns-Knight..SKL4	1750e	1750	1445g	.....	e1995	2350	d2195‡	125	31x4½
Stearns-Knight.....6	2395	2395	2495	2195g	[3195	[3395	3395	130	34x4½
					[3450h	[3200‡			
Stephens.....10	1295	1295	.....	.....	1595d	1995	.....	117	32x4
Stephens.....20	.....	1750	1595	1850e	.....	.....	2250	124	33x4½
Sterling-Knight.....	.....	1985	.....	2200e	.....	2800	d2750	125	32x4½
Studebaker..Light Six	975	995	845g	.....	1195	1185	1395d	112	31x4
Studebaker..Spec'l Six	1325	1350	.....	1100g	1895d	1935	.....	119	32x4
Studebaker....Big Six	1450g	.....	1750	1835d	.....	2495	2685	126	33x4½
Stutz.....	1995	1995	.....	2315d	.....	2550	.....	120	32x4
Stutz.....KLDH	2450	2700	2640	[2765a	3250	3190	.....	130	32x4½
				[3115e					
Stutz.....Speedway	.....	2650	2685	.....	3600f	3350	3500	130	32x4½*
Templar.....	.....	1895	.....	1995b	2495	2595	.....	122	.....
Velie.....58	1275	[1275	.....	[1525b	[1485d	[1895	1945‡	118	32x4*
		[1095		[1565d	[1545d	[2095‡			
Washington.....6	.....	1785	.....	.....	.....	.....	.....	116	32x4
Westcott.....48	.....	.....	1990	2190f	.....	.....	.....	125	32x4½
Westcott.....44	.....	1690	1590e	.....	[2490‡	2490	.....	120	32x4½
					[1795				
Westcott.....50	.....	1690	.....	1840	2190	2290	2090	.....	*
Wills Ste. Claire..A-68	2575	2475	.....	.....	3375‡	[3225	[3475	121	32x4½*
						[3575	[3850§		
Wills Ste. Claire..B-68	.....	.....	2875	2875d	.....	.....	.....	127	32x4½*
Willys-Knight.....64	1175	1175	.....	1635e	[1550e	[1895p	.....	118	32x4
					[1450e	[1795			
Willys-Knight.....67	.....	.....	1325	.....	.....	.....	1995	124	32x4½
Winton.....40	3400	3800	3400	.....	4250e	4450p	[4550	132	33x5
							[4700§		

*—Balloon tires optional at extra cost
a—2 Passenger
b—3 Passenger
c—4 Passenger
d—5 Passenger
††—On Standard Phaeton Models
‡—Brougham
e—6 Passenger
f—7 Passenger
g—Chassis Price
p—Sport Model
§—Limousine
r—Price without starter and demountable rims. Price, complete, Ford $350.
s—Price without starter and demountable rims. Price, complete, Ford $380.
J—Optional equipment at extra cost

Mechanical Specifications of 1924 Passenger Cars

For Current Prices See Page 51

MAKE AND MODEL	Wheel Base (Ins.)	Tire Size (Ins.) ‡‡	ENGINE: Make and Model	ENGINE: Number of Cylinders Bore and Stroke (Ins.)	ENGINE: Rated Horse Power (N. A. C. C.)	ENGINE: Piston Displacement (Cu. Ins.)	ENGINE: Valves: Arrangement	ENGINE: Valves: Drive	ENGINE: Piston Material	ENGINE: Oiling System	ENGINE: Water Circulation	ENGINE: Fuel System: Carburetor Make	ELECTRICAL SYSTEM: Ignition Make	ELECTRICAL SYSTEM: Generator and Starter Make	ELECTRICAL SYSTEM: Battery Make	TRANSMISSION: Clutch Make	TRANSMISSION: Clutch Type
American 66	127	33x4½	H-S 91	6-3½x5	29.4	288	L	Ge	CI	SpPr	Pu	Str	A-K	G&D	Exi	B&B	SP
Anderson 41	115	32x4*	Con 7U	6-3⅛x4¼	23.4	195	L	Ch	CI	PrCs	Pu	Zen	Wes	Wes	Wil	B&B	SP
Anderson 50	122	32x4*	Con 8R	6-3⅛x4½	27.3	241	L	Ge	CI	PrCs	Pu	Zen	Rem	Rem	Wil	B&B	SP
Apperson 6	120	32x4*	Fal T8000	6-3⅛x4¼	23.4	195	I	Ge	CI	SpPr	TS	Str	Rem	Rem	Pre	Roc	SP
Apperson 8	130	33x5	Own	8-3¼x5	33.8	331	L	Ge	CI	FlPr	TS	Joh	Rem	Bij	Pre	Own	MD
Auburn 6-63	122, 124	32x4½	Own	6-3¼x5	25.3	248	I	Ch	CI	PrCs	Pu	Str	Rem	Rem	Exi	B&B	SP
Auburn 6-43	114	31x4*	Con 7U	6-3⅛x4¼	23.4	195	L	Ch	CI	PrCs	Pu	Str	Rem	Rem	Exi	B&B	SP
Barley 6-50	118	32x4	Con 7U	6-3⅛x4¼	23.4	195	L	Ch	CI	PrCs	Pu	Str	Del	Del	Pre	B&B	SP
Buick 4	109	31x4	Own	4-3⅜x4¾	18.2	170	I	Ge	CI	SpPr	Pu	Mar	Del		Exi	Own	MD
Buick 6	120, 128	32x4, 32x4½	Own	6-3⅜x4¾	27.3	255	I	Ge	CI	PrCs	Pu	Mar	Del	Del	Exi	Own	MD
Cadillac 63	132	33x5	Own	8-3⅛x5⅛	31.2	314	L	Ch	CI	PrCs	Pu	Own	Del	Del	Exi	Own	MD
Case X	122	32x4½	Con 8R	6-3⅜x4½	27.3	241	L	Ge	CI	PrCs	Pu	Sch	Del	Del	Wil	Own	MD
Case Y	132	33x5	Con 6T	6-3⅝x4¾	31.5	262	L	Ch	CI	PrCs	Pu	Ray	Del	Del	Wil	Own	MD
Chalmers Y	117, 122	32x4, 33x4½	Own	6-3¼x4½	25.3	224	L	Ch	Al	SpPr	TS	Str	A-L	A-L	Wes	Mec	SP
Chandler	123	32x4*	Own	6-3½x5	29.4	288	L	Ch	CI	SpPr	Pu	Str	Bos	Bos	Pre	B&B	SP
Chevrolet Sup	103	30x3½	Own	4-3⅛x4	21.7	170	I	Ge	CI	SpPr	Pu	Hol, Zeni	Rem	Rem	Exi	Own	Co
Chrysler		29x4½	Own	6-3 x4¾	21.6	201	L	Ch	Al	PrCs	Pu	B&B	Rem	Rem		Own	MD
Cleveland 42	112½	31x4*	Own	6-3⅛x4½	22.5	199	I	Ch	CI	SpPr	Pu	Str	Bos	Bos	Pre	B&B	SP
Cole 1924	127½	33x5*	Nor 311	8-3½x4½	39.2	346	L	Ge	Al	PrCs	Pu	Joh	Del	Del	Wil	Nor	MD
Columbia L-6	115	31x4*	Con 7U	6-3⅛x4¼	23.4	195	L		CI	PrCs	Pu	Str	A-L	A-L	USL	B&B	SP
Columbia B-6	115	31x4*	Con 8R	6-3⅜x4½	27.3	241	L	Ge	CI	PrCs	Pu	Str	A-L	A-L	USL	B&B	SP
Cunningham V	132, 142	33x5	Own	8-3¾x5	45.0	441	L	Ge	Al	SpPr	Pu	Str	Del	Del	Wil	Own	MD
Davis 71	115	31x4*	Con 7U	6-3⅛x4¼	23.4	195	L	Ch	CI	PrCs	Pu	Str	A-L	A-L	Wil	B&B	SP
Davis 81	118	31x4*	Con 8R	6-3⅜x4½	27.3	241	L	Ge	CI	PrCs	Pu	Str	A-L	A-L	Wil	B&B	SP
Dodge 1924	116	32x4*	Own	4-3⅞x4½	24.0	212	L	Ge	Al	Spla	Pu	Ste	N-E	N-E	Exi	Own	MD
Dort 27	115	31x4	Fal DT8000	6-3⅛x4¼	25.3	224	I	Ge	CI	PrCs	TS	Car	Bos	Bos	USL	Dtl	MD
Duesenberg 8	134	33x5	Own	8-2⅞x5	26.4	259	I	Ge	Al	PrCs	Pu	Str	Del	Del	Wil	Own	SP
DuPont C	124	32x4½	H-S 90	6-3½x5	29.4	288	L	Ge	CI	SpPr	Pu	Str	Wes	Wes	Wes	B-L	MD
Durant A22	109	31x4	Con Spec	4-3⅞x4¼	24.0	200	I	Ge	CI	PrCs	Pu	Til	A-L	A-L	USL	Own	SP
Eagle 6	115	30x3½	Con Spec	6-3⅛x4¼	23.4	195	L	Ch	CI	PrCs		Til	A-L	A-L	USL		SP
Elcar 6-60	118	32x4*	Con 8R	6-3⅜x4½	27.3	241	L	Ge	CI	PrCs	Pu	Str	Del	Del	Wil	B&B	SP
Elcar 4-40	112	31x4*	Lyc CF	4-3⅝x5	21.0	206	L	Ge	Al	PrCs	TS	Zen	Del	Del	Wil	B&B	SP
Elgin 25	118	32x4½*	Fal T8000	6-3⅛x4¼	23.4	195	I	Ge	CI	SpPr	TS	Str	DeJ	DeJ	USL	B&B	SP
Essex 6	110½	31x3¾	Own	6-2⅝x4	16.5	130	L	Ch	Al	Spla	TS	Det	Bos	Bos	Pre	Own	MO
Flint	120	32x4½*	Con Spec	6-3⅜x5	27.3	268	L	Ch	CI	FlPr	Pu	Str	A-L	A-L	USL	Own	SP
Ford T	100	30x3½	Own	4-3¾x4	22.5	176	L	Ge	CI	Spla	TS	Own, Hol	Own	Own	Own, Exi	Own	MO
Fox 7F	132	32x4½	Own	6-3⅝x5	27.3	268	I	Ch	Al	SpPr	No	Zen	Sci	Wes	Exi	B-L	MD
Franklin 10-B	115	32x4½*	Own	6-3¼x4	25.3	199	I	Ch	Al	SpPr	No	Own	A-K	A-K	Wil	M&E	SP
Gardner 5	112	32x4	Lyc Spec	4-3½x5	21.7	213	L	Ge	Al	PrCs	TS	Zen	Wes	Wes	Wil	B&B	SP
Gray N & O	100, 103½	30x3½	Own	4-3⅜x4	21.0	165	L	Ge	CI	Spla	TS	Sco	Wes	Wes	USL	Own	SO
H. C. S. 4	120	32x4½	Wei	4-3¾x5½	22.5	242	I		CI	SpPr	Pu	Str	Del	Del	Wil	B-L	MD
H. C. S. 6	126	32x4½*	Own	6-3½x5	29.4	288	I	Ch	CI	FlPr	Pu	Str	Del	Del	Wil	B-L	MD
Hatfield 6-55	121	32x4	H-S 40	6-3¼x5	25.3	248	L	Ge	CI	SpPr	Pu	Str	Bos	Bos	Exi	B&B	SP
Haynes 60	121	32x4½	Own	6-3½x4¾	29.2	274	L	Ge	CI	SpPr	Pu	Ray	Kin	L-N	Pre	Own	MD
Hudson 6	126	34x4½	Own	6-3½x5	29.4	288	L	Ch	Al	Spla	Pu	Ste	Bos	Bos	Exi	Own	MO
Hupmobile R	115	32x4	Own	4-3¼x5½	16.9	182	L	Ch	Al	PrCs	TS	Str	A-K	Wes	Wil	Lon	MD
Jewett	112	31x4*	Own	6-3¼x5	25.3	249	L	Ge	CI	PrCs	Pu	Str, Ray	Rem	Rem	Wes	Lon	MD
Jordan MX	120	32x4	Con Spec	6-3 x4¾	26.3	245	L	Ch	CI	PrCs	Pu	Str	Del	Del	Wil	Dep	SP
Jordan H L	124½	32x4½	Con Spec	6-3 x4¾	26.3	245	L	Ch	CI	PrCs	Pu	Str	Del	Del	Wil	Det	SP
King L K	120, 124	32x4½	Own	8-3 x5	28.8	282	L	Ch	CI	SpPr	TS	Ba&B	A-K	Wes	Pre	Det	MD
Kissel 55	121	32x4*	Own Spec	6-3 x5½	26.3	265	L	Ge	CI	SpPr	Pu	Str	Rem	Rem	Wil	B&B	SP
LaFayette	132	33x5*	Own	8-3¼x5¼	33.8	348	L	Ch	CI	PrCs	Pu	Joh	Del	Del	Exi	Own	MD
Lexington Concord	119	32x4*	Ans M	6-3 x4½	26.3	232	I	Ch	CI	FlPr	Pu	Ray	Cnn	G&D	Wil	Lon	MD
Lexington MM	123	32x4½*	Ans F	6-3 x5¼	26.3	271	I	Ch	CI	FlPr	Pu	Ray	Cnn	G&D	Wil	Lon	MD
Liberty 10-D	117	32x4	Own	6-3½x5	23.4	230	L	Ge	CI	FlPr	TS	Str	Wag	Wag	Pre	B&B	SP
Lincoln	136	33x5	Own	8-3⅝x5	36.4	357	L	Ch	Al	PrCs	Pu	Str	Del	Del	Exi	Own	MD
Locomobile	142	35x5*	Own	6-4½x5½	48.6	524	T	Ge	CI	SpPr	Pu	B&B	Del	Wes	Wes	Own	MD
McFarlan SV	127	32x4½	Wis Y	6-3⅜x5	27.3	268	I	Ch	Al	FlPr	Pu	Ray	Del	Del	Wil	Lon	MD
McFarlan TV	140	33x5	Own	6-4½x6	48.6	572	T	Ge	Al	FlPr	Pu	Ray	Wes, Spl	Wes	Wil	M&E	MD
Marmon 34	136	32x4½*	Own	6-3⅜x5½	33.7	339	I	Ge	Al	FlPr	Pu	Str	Del	Del	Pre	Own	MD
Maxwell 25	109	31x4	Own	4-3⅝x4½	21.0	186	L	Ge	Al	SpPr	TS	Ste	Rem	Rem	Wes	Mec	SP
Moon 6-40	115	31x4*	Con 7U	6-3⅛x4¼	23.4	195	L	Ch	CI	PrCs	Pu	Str	Del	Del	Exi	B&B	SP
Moon 6-58	128	32x4½*	Con 8R	6-3⅜x4½	27.3	241	L	Ge	CI	PrCs	Pu	Str	Del	Del	Exi	B&B	SP
Moon 6	113	31x4*	Con 7U	6-3⅛x4¼	23.4	195	L	Ch	CI	PrCs	Pu	Str	Del	Del	Exi	B&B	SP
Nash 4	112	33x4	Own	4-3⅜x5	18.2	178	I	Ge	SS	SpPr	Pu	Mar	Del	Del	Wil	B&B	SP
Nash 6	121, 127	33x4, 34x4½	Own	6-3¼x5	25.3	249	I	Ge	CI	SpPr	Pu	Mar	Del	Del	Wil	B&B	SP

Mechanical Specifications of 1924 Passenger Cars

For Current Prices See Page 51.

TRANSMISSION			REAR AXLE					BRAKES			GENERAL					MAKE AND MODEL
Gearset		Universals						Service		Emergency		Steering Gear	Springs			
Make	Location	Type and Make	Make and Model	Type	Gear Ratio ‡‡	Propulsion Taken By	Torque Taken By	Type and Location	Application	Type and Location	Front Axle Make	Make	Front Type	Rear Type	Chassis Lubrication	
B-L	Eng	m-Har	Sal	FF	5.10	Sp	Sp	Ext-Rw	DiM	Int-Rw	Sal	Lav	½E	½E	PG	American 6
Dur	Eng	f-Goo	Sal C	½F	5.75	Sp	Sp	†Ext-Rw	DiM		Sal	Gem	½E	½E	PG	Anderson 41
Dur	Eng	f-Goo	Sal A	¾F	4.50	Sp	Sp	†Ext-Rw	DiM		Sal	Gem	½E	½E	PG	Anderson 50
Mec	Eng	m-Thi	Col 12000	½F	5.10	Sp	Sp	†Ext-Rw	DiM	Int-Rw	Col	Lav	½E	¾E	PG	Apperson 6
Own	SeU	m-Thi	Own	½F	4.25	Sp	Sp	†Ext-Rw	DiM	Int-Rw	Own	Own	½E	¾E	PG	Apperson 8
War	Eng	m-Thi	Col 12002	½F	4.65	Sp	Sp	†Ext-Rw	DiM	Ext-DS	Col	Ros	½E	½E	PG	Auburn 6-63
War	Eng	m-Uni	Col 12001	½F	4.63	Sp	Sp	†Ext-Rw	DiM	Ext-Ds	Col	Jac	½E	½E	OC	Auburn 6-43
Ful	Eng	f-M&E	Col 12000	¾F	5.10	Sp	Sp	†Ext-Rw	DiM	Int-Rw	Col	Jac	½E	½E	PG	Barley 6-50
Own	Eng	m-Own	Own	¾F	4.70	TT	TT	Ext-Fw	DiM	Int-Rw		Jac	½E	½E	OC	Buick 4
Own	Eng	m-Own	Own	FF	4.54	TT	TT	Ext-Fw	DiM	Int-Rw	Own	Jac	½E	Ca	OC	Buick 6
Own	Eng	m-Spi	Own	FF	4.50	Sp	TA	I&E-Fw	DiM	Int-Rw	Own	Own	½E	Pl	PG	Cadillac 63
Own	Eng	f-Sne	Col 33004	½F	4.90	Sp	Sp	Ext-Rw	DiM	Int-Rw	Col	Jac	½E	½E	PG	Case X
Own	Eng	f-Sne	Col 50051	¾F	4.59	Sp	TA	Ext-Rw	DiM	Int-Rw	Col	Jac	½E	½E	PG	Case Y
War	Eng	m-Mec	Tim Spec	½F	5.10	Sp	Sp	†Ext-Rw	DiM	Int-Rw	Own	Gem	½E	½E	PG	Chalmers Y
Own	Eng	f-Own	Own	FF	4.45	Sp	Sp	†Ext-Rw	DiM	Ext-Ds	Own		½E	½E	OC	Chandler
Own	Eng	m-Own	Own	½F	3.77	Sp	TT	Ext-Rw	DiM	Int-Rw	Own	Own	¼E	¼E	PG	Chevrolet Sup
Own	Eng	m-Det	Own	½F	4.60			Ext-Fw	Hyd	Ext-Ds	Own		½E	½E	PG	Chrysler
Own	Eng	m-Mec	Own	½F	4.90	Sp	Sp	Ext-Rw	DiM	Ext-Ds	Own	CAS	½E	½E	PG	Cleveland 42
Nor	Eng	m-Spi	Col 50000	FF	4.70	Sp	Sp	Ext-Rw	DiM	Int-Rw	Col	Gem	½E	½E	OC	Cole 1924
Dur	Eng	m-Spi	Tim 5010	½F	4.80	Sp	Sp	†Ext-Rw	DiM	Ext-DS	Tim	Gem	½E	½E	OC	Columbia L-6
Dur	Eng	m-Spi	Tim 5002	½F	4.75	TA	TA	†Ext-Rw	DiM	Int-Rw	Tim	Gem	½E	Ca	GC	Columbia B-6
Own	Eng	f-Sne	Tim 5712	FF	4.22	Sp	TA	Ext-Rw	DiM	Int-Rw	Tim	Gem	½E	¾E	PG	Cunningham V
War	Eng	m-Pet	Tim 5002	½F	5.10	Sp	Sp	†Ext-Rw	DiM	Int-Rw	Tim	CAS	½E	½E	OC	Davis 71
War	Eng	m-Pet	Tim 5002	½F	5.10	Sp	Sp	†Ext-Rw	DiM	Int-Rw	Tim	Ros	½E	½E	OC	Davis 81
Own	Eng	m-Own	Own	½F	4.54	Sp	TT	Ext-Rw	DiM	Int-Rw	Own	Own	½E	½E	PG	Dodge 1924
Own	Eng	f-The	Fli 2KA10	¾F	4.66	Sp	TA	Ext-Rw	DiM	Int-Rw	Fli	Gem	½E	Ca	PG	Dort 27
Own	Eng	f-Cli	Own	½F	4.90	R&T	TT	Int-Fw	Hyd	Ext-DS	Own	Lav	½E	½E	PG	Duesenberg 8
B-L	Eng	m-Spi	Col 50000	FF	4.45	Sp	Sp	Ext-Rw	DiM	Int-Rw	Col	Jac	½E	½E	PG	DuPont C
War	SeU	m-Spi	Ada Spec	¾F	4.33	Sp	Sp	†Ext-Rw	DiM	Int-Rw	Ada	War	½E	½E	PG	Durant A22
War	SeU		Ada Spec	½F	4.77			Int-Fw	DiM	Int-Fw	Ada	War	½E	½E	PG	Eagle 6
War	Eng	m-Har	Sal A	¾F	4.70	Sp	Sp	†Ext-Rw	DiM	Int-Rw	Sal	Gem	½E	½E	OC	Elcar 6-60
War	Eng	m-Mec	Sal C	½F	4.70	Sp	Sp	†Ext-Rw	DiM	Ext-DS	Sal	CAS	½E	E	OC	Elcar 4-40
War	Eng	f-Sne	Col 11015	½F	4.66	TT	TA	Int-Fw	DiM	Ext-Ds	Col	Ros	½E	½E	PG	Elgin 25
Own	Eng	m-Spi	Own	½F	5.60	Sp	Sp	Ext-Rw	DiM	Ext-Rw		Own	½E	½E	OC	Essex 6
War	SeU	m-Spi	Ada Spec	½F	4.78	Sp	Sp	Ext-Rw	DiM	Int-Rw	Ada	War	½E	½E	PG	Flint
Own	Eng	m-Own	Own	¾F	3.63	TT	Sp	Ext-Ds	DiM	Int-Rw	Own	Own	T½	T½	GC	Ford T
B-L	Eng	m-Spi	Tim 5310	½F	4.90	Sp	TA	Ext-Rw	DiM	Int-Rw	Tim	Ros	½E	½E	PG	Fox 7F
Own	Eng	m-Spi	Own	FF	4.72	Sp	Sp	Ext-DS	DiM	Ext-Rw	Own	Own	FE	FE	PG	Franklin 10-B
Mec	Eng	m-Pet	Fli 44EA	¾F	4.80	Sp	Sp	Ext-Rw	DiM	Ext-DS	Fli	Dit	½E	½E	PG	Gardner 5
Det	Eng	(m-Mec f-Sne)	Tim 500	½F	3.90	Sp	Sp	Int-Rw	DiM	Ext-DS	Tim	Own	½E	½E	OC	Gray N & O
B-L	Eng	m-Spi	Own	¾F	4.63	TT	TT	Int-Rw	DiM	Int-Rw	Own	Gem	½E	½E	OC	H. C. S. 4
B-L	Eng	m-Spi	Own	¾F	4.36	TT	TT	Int-Rw	DiM	Int-Rw	Col	Gem	½E	½E	OC	H. C. S. 6
Dur	Eng	m-Spi	Col 12000	½F	4.63	Sp	Sp	Ext-Rw	DiM	Int-Rw	Col	Gem	½E	½E	PG	Hatfield 6-55
Mec	Eng	m-Thi	Own	½F	4.41	Sp	Sp	Ext-Rw	DiM	Ext-DS	Own	Jac	½E	½E	BG	Haynes 60
Own	Eng	m-Spi	Own	½F	4.45	Sp	Sp	Ext-Rw	DiM	Ext-Rw	Own	Jem	½E	½E	OC	Hudson 6
Own	Eng	m-Uni	Own	¾F	4.87	Sp	Sp	Ext-Rw	DiM	Int-Rw	Own	Jac	½E	½E	PG	Hupmobile R
War	Eng	m-Mec	Tim Spec	½F	4.80	Sp	Sp	Ext-Rw	DiM	Int-DS	Tim	Gem	½E	½E	PG	Jewett
Dep	Eng	m-Thi	Tim 5200	½F	4.42	Sp	Sp	†Ext-Rw	DiM	Int-Rw	Tim	Gem	½E	½E	PG	Jordan MX
Det	Eng	m-Thi	Tim 5200	½F	4.42	Sp	Sp	†Ext-Rw	DiM	Int-Rw	Tim	Gem	½E	½E	PG	Jordan H & L
Own	Eng	-Uni	Col 5016	FF	4.88	TT	TA	Ext-Rw	DiM	Int-Rw	Col	Jac	½E	Ca	PG	King L & K
War	Eng	m-Spi	Tim 5140	¾F	4.42	Sp	Sp	Ext-Rw	DiM	Int-Rw	Tim	Jac	½E	½E	OC	Kissel 55
Own	Eng	m-Own	Sta	FF	4.58	TT	TT	†Ext-Rw	DiM	Int-Rw	Own	Own	½E	½E	PG	LaFayette
War	Eng	f-Sne	Sal	½F	5.10	Sp	Sp	Ext-Rw	DiM	Ext-Ds	Sal	Ros	½E	½E	PG	Lexington Concord
War	Eng	f-Sne	Sal	½F	5.10	Sp	Sp	Ext-Rw	DiM	Ext-Ds	Sal	Ros	½E	½E	PG	Lexington MM
Det	Eng	m-Spi	Tim	½F	4.80	Sp	Sp	Ext-Rw	DiM	Ext-Ds	Tim	Gem	½E	½E	OC	Liberty 10-D
Own	Eng	m-Spi	Tim Spec	FF	4.58	TT	TT	Ext-Rw	DiM	Int-Rw	Tim	Own	½E	½E	PG	Lincoln
Own	SeU	m-Own	Own	FF	3.50	RR	TA	†Ext-Rw	DiM	Int-Rw	Own	Own	½E	¾E	PG	Locomobile
War	Eng		Uni 400	¾F	5.10	Sp	TA	Int-Rw	DiM	Ext-DS	Sal	Ros	½E	½E	OC	McFarlan SV
B-L	SeU	(f-Sne f-Pet)	Tim 5712	FF	3.50	Sp	TA	†Ext-Rw	DiM	Int-Rw	Tim	Ros	½E	½E	OC	McFarlan TV
Own	RA	m-Spi	Own	¾F	4.10	TT	TA	†Int-Rw	DiM	Int-Rw	Own	Own	½E	TE	PG	Marmon 34
Own	Eng	(m-Own f-Own)	Own	½F	4.60	Sp	Sp	Ext-Rw	DiM	Ext-DS	Own	Own	½E	½E	PG	Maxwell 25
B-L	Eng	m-Spi	Tim 5010	½F	5.10	Sp	Sp	Ext-Rw	DiM	Ext-DS	Tim	Gem	½E	½E	OC	Moon 6-40
War	Eng	m-Spi	Tim 5142	½F	5.09	Sp	Sp	†Ext-Rw	DiM	Int-Rw	Tim	Gem	½E	½E	OC	Moon 6-58
		m-Spi	Tim 5010	½F	5.10	Sp	Sp	†Ext-Rw	DiM	Ext-DS	Tim	Gem	½E	½E	OC	Moon 6
Own	Eng	m-Own	Own	½F	5.50	Sp	Sp	Ext-Rw	DiM	Ext-DS	Own	Gem	½E	½E	PG	Nash 4
Own	Eng	m-Own	Own	½F	4.50	Sp	Sp	Ext-Rw	DiM	Ext-DS	Own	Gem	½E	½E	OC	Nash 6

Mechanical Specifications of 1924 Passenger Cars—Continued

MAKE AND MODEL	Wheel Base (Ins.)	Tire Size (Ins.) ‡‡	ENGINE: Make and Model	ENGINE: Number of Cylinders Bore and Stroke (Ins.)	ENGINE: Rated Horse Power (N. A. C. C.)	ENGINE: Piston Displacement (Cu. Ins.)	ENGINE: Valves: Arrangement	ENGINE: Valves: Drive	ENGINE: Piston Material	ENGINE: Oiling System	ENGINE: Water Circulation	ENGINE: Fuel System: Carburetor Make	ELECTRICAL SYSTEM: Ignition Make	ELECTRICAL SYSTEM: Generator and Starter Make	ELECTRICAL SYSTEM: Battery Make	TRANSMISSION: Clutch Make	TRANSMISSION: Clutch Type
National	BB	130	32x4½	Own	6-3½x5¼	29.4	303	I	Ch	SS	PrCs	Pu	Ray	Del	Wes	Pre	B&B	SP
Oakland	6-54	113	31x4	Own	6-2¹³⁄₁₆x4¾	18.9	177	L	Ch	Al	PrCs	Pu	Str	Rem	Rem	Pre	Hoo	SP
Oldsmobile	30	110	31x4	Own	6-2⅞x4¾	18.1	168	L	Ge	CI	PrCs	Pu	Zen	Vel	Del	Wil	B&B	SP
Overland	91-92	{100} {106}	30x3½	Own	4-3½x4	19.6	154	L	Ge	CI	Spla	PS	Til	A-L	A-L	USL	B&B	SP
Packard	S-6	{126} {133}	33x4½	Own	6-3⅜x5	27.3	268	L	Ch	CI	PrCs	Pu	Own	Del	A-K	{Wil} {Pre}	Own	MD
Packard	S-8	{136} {143}	33x5	Own	8-3⅜x5	36.4	357	L	Ch	CI	PrCs	Pu	Own	Del	O-D	{Wil} {Pre}	Own	MD
Paige	6-70	131	33x4½	Con	Spec 6-3¾x5	33.7	331	L	Ch	CI	PrCs	TS	Ray	Rem	Rem	Wes	Lon	MD
Peerless	6	126	32x4½	Own	6-3½x5	29.4	288	L	Ch		PrCs	Pu	Joh	Del	Del	Exi	Own	MD
Peerless	66	128	33x5	Own	8-3¼x5	33.8	331	L	Ge	CI	PrCs	Pu	B&B	Del	Del	Exi	Own	MD
Pierce-Arrow	33	138	33x5	Own	6-4 x5½	38.4	414	T	Ge	CI	PrCs	Pu	Own	Del	Del	Wil	Own	MD
Pilot	6-56	126	32x4½	H-S	90 6-3½x5	29.4	288	L	Ge	CI	SpPr	Pu	Til	Wag	Wag	Pre	Hoo	MD
Premier	6-D	126½	32x4½	Own	6-3⅜x5½	27.3	295	I	Ge	Al	FlPr	Pu	Str	Del	Del	Pre	B&B	SP
R. & V. Knight	H	124	32x4½	Own	6-3½x4½	29.4	259	Sl	Ch	CI	PrCs	TS	Str	A-L	A-L	Wil	B-L	SP
Reo	T-6	120	32x4	Own	6-3⅜x5	24.3	239	F	Ge	Al	SpPr	Pu	Ray	N-E	N-E	Wil	Own	MD
Revere	M	121	32x4½	Mon	M 4-4¾x6	30.6	360	I	Ch	Al	SpPr	Pu	Str	Bos	Wes	Pre	P-L	MD
Rickenbacker	C	117	32x4*	Own	6-3½x4¾	23.4	218	L	Ch	CI	PrCs	Pu	Str	Bos	Bos	USL	Own	SP
Roamer	4-75E	128	32x4½	Due	G1 4-4¼x6	28.9	340	I	Ch	Al	PrCs	Pu	Str	Bos	Wes	Pre	B-L	MD
Roamer	6-54E	118	32x4½	Con	12XD 6-3½x5¼	29.4	303	L	Ge	Al	SpPr	Pu	Str	Spl	Wes	Pre	B&B	SP
Rollin		112	31x5¼	Own	4-3¼x4½	16.9	149	L	Ge	Al	PrCs	PS	Til	O-C	O-D	USL	B&B	SP
Rolls Royce		143½	33x5	Own	6-4½x4¾	48.6	453	L	Ge	Al	FlPr	Pu	Own	Bos	Spe	Exi	Own	Co
Sayers	G-L	136	33x5	Con	6J 6-3¾x5	33.7	331	L	Ge				Str	Del	Del	Wil	B&B	SP
Seneca	50-51	112	31x4	Lyc	CF 4-3⅝x5	21.3	206	L	Ge	Al	PrCs	TS	Zen	A-L	A-L	Pre	B&B	SP
Stanley	740	130	32x4½	Own	2-4 x5	13.0	250	Sl	No	CI	Spla		No	No	Bij	Wes	No	
Star		102	30x3½	Con	Spec 4-3½x4¼	15.6	130	L	Ch	CI	SpPr	Pu	Til	A-L	A-L	USL	Own	SP
Stearns-Knight	4	119	33x4½	Own	Kni 4-3¾x5⅝	22.5	248	Sl	Ch	CI	PrCs	Pu	Sch	A-K	A-L		Own	MD
Stearns-Knight	6	130	33x5	Own	Kni 6-3¼x5	27.3	249	Sl	Ch	CI	PrCs	Pu	Sch	A-K	A-L		Own	MD
Stephens	20-104	{117} {124}	32x4 {33x4½}	Own	6-3¼x4½	25.3	224	I	Ce	CI	FlPr	TS	Str	Del	Del	USL	B&B	SP
Sterling-Knight	B-6	125	32x4½	Own	Kni 6-3¼x4⅝	25.3	230	Sl	Ch	CI	FlPr	TS	Str	Wes	Wes	USL	Ful	MD
Studebaker	L-6	112	31x4	Own	6-3⅛x4½	23.4	207	L	Ch	CI	SpPr	Pu	Str	{Rem} {Wag}	{Rem} {Wag}	Wil	Own	SP
Studebaker	S-6	119	32x4	Own	6-3½x5	29.4	289	L	Ge	CI	SpPr	Pu	Str	{Rem} {Wag}	{Rem} {Wag}	Wil	Own	SP
Studebaker	B-6	126	33x4½	Own	6-3⅞x5	36.0	354	L	Ge	CI	SpPr	Pu	B&B	{Rem} {Wag}	{Rem} {Wag}	Wil	Own	SP
Stutz	695	130	32x4½	Own	6-3½x5	29.4	288	I	Ch	CI	PrCs	Pu	Str	Rem	Rem	Wil	B&B	SP
Stutz	KLDH	130	32x4½	Own	4-4⅜x6	30.6	361	T	Ge	CI	PrCs	Pu	Str	Del	Rem	Wil	War	MD
Stutz	690	120	32x4*	Wei	690 6-3⅜x5	27.3	268	5	Ch		PrCs	Pu	Str	Rem		Rem	B&B	SP
Templar	6	122	32x4	Own	6-3⅜x5	27.4	268	L		CI	SpPr	Pu	T.l	Dyn	Dyn	Pre	M&E	SP
Velie	58	118	32x4*	Own	6-3 5/16 x4¼	24.6	203	I	Ge	CI	FlPr	TS	Str	A-K	Wes	Wil	Doo	SP
Westcott	D-48	125	32x4½	Con	12X 6-3½x5¼	29.4	303	L	Ge	Al	PrCs	Pu	Ray	Del	Del	Wil	B&B	SP
Westcott	C-44	120	32x4½	Con	8R 6-3⅝x4½	27.3	241	L	Ge	CI	PrCs	Pu	Ray	Del	Del	Wil	B&B	SP
Westcott	60		*	Own	6-3¼x5	25.3	248	L	Ge				Ray	Del	Del	Wil		
Wills Ste Claire	A B-6S	{121} {127}	32x4½*	Own	8-3¼x4	33.8	265	I	Ge	CI	FlPr	TS	Hol	Del	Del	Wil	Own	MD
Willys-Knight	64-67	{118} {124}	32x4 32x4½	Own	Kni 4-3⅝x4½	21.0	186	Sl	Ch		SpPr	TS	Til	A-L	A-L	Wil	Own	MD
Winton	40	132	33x5	Own	6-3¾x5¼	33.7	348	L	Ch	CI	PrCs	Pu	Ray	Del	Del	Wil	B-L	MD

*c—Balloon Tires optional at extra cost.

†—Four Wheel Brakes optional at extra cost

††—Applying to Standard Phaeton Models.

ABBREVIATIONS: PASSENGER CARS—

A—Artillery
Ada—Adams
A-K—Atwater-Kent
A-L—Auto-Lite
Al—Aluminum
Ans—Ansted
Aut—Automatic
B—Battery
B & B—Borg & Beck
B & B—Ball & Ball
Bij—Bijur
B-L—Brown-Lipe
Blo—Blood
Bos—Bosch
Bud—Budd
Buf—Buffalo
Car—Carter
Ch—Chain
CI—Cast Iron
Cle—Cleveland
Cli—Climax
C & L—Cam & Lever
Co—Cone
Col—Columbia
Conn—Continental
Cnn—Connecticut
D—Disk
DeJ—DeJon
Del—Delco
Det—Detroit
Det—Detachable
DiM—Direct Mechanical
Dit—Ditweiler
Doo—Dooley
Dtl—Detlaff
Due—Duesenberg
Dt—Detachable
Dur—Durston
Eat—Eaton
Eng—Unit with Engine
½E—Semi Elliptic
¾E—Three Quarter Elliptic
Ext-DS—External Driveshaft
Ext-RW—External Rear Wheels
Exi—Exide
F—Valves in head and side
f—Fabric
Fal—Falls
½F—Semi Floating
¾F—Three Quarter Floating
FE—Full Elliptic
FF—Full Floating
Fir—Firestone
Fli—Flint
FlPr—Full pressure to all bearings including wrist pins
Ful—Fuller
G&D—Gray & Davis
Ge—Helical Gear
Gem—Gemmer
GC—Grease Cups
Goo—Goodrich
Gra—Gravity
Ha—Hand
H&A—Hand and Automatic
Har—Hartford
Hay—Hayes
Hol—Holley
H-S—Herschell-Spillman
Hyd—Hydraulic
I—Both valves in head
I & E FW—Internal and External Four Wheels
Int-Rw—Internal Rear Wheels
It—Integral
Jac—Jacox
Jax—Jaxon
Joh—Johnson

There Are Many Ways in Which These Specifications Can Be Applied. One Way Is to Figure Out the Specifications of the Average American Car

Many persons connected in any way with the automotive industry like to know what the mechanical specifications of the average American car are. Several years ago MOTOR AGE used to figure out this car from the data presented on all the chassis models. This entailed considerable work and in the belief that the space could be used to better advantage in the annual show issue and specification number, we have omitted the "Average Car" in this issue as well as in last year's issue.

Mechanical Specifications of 1924 Passenger Cars—Continued

TRANSMISSION			REAR AXLE					BRAKES			GENERAL					MAKE AND MODEL
Gearset		Universals						Service		Emergency		Steering Gear	Springs			
Make	Location	Type and Make	Make and Model	Type	Gear Ratio ‡‡	Propulsion Taken By	Torque Taken By	Type and Location	Application	Type and Location	Front Axle Make	Make	Front Type	Rear Type	Chassis Lubrication	
B-L	Eng	m-Uni	Col 50000	FF	4.08	Sp	TA	Ext-Rw	DiM	Int-Rw	Col	War	½E	½E	PG	National BB
Mun	Eng	m-Mec	Own	½F	4.70	Sp	Sp	Ext-Fw	DiM	Ext-DS	Own	Jac	½E	½E	PG	Oakland 6-54
Mun	Eng	f-Own	Own	½F	5.10	Sp	Sp	Ext-Rw	DiM	Ext-DS	Own	Mun	½E	½E	PG	Oldsmobile 30
Own	Eng	m-Own	Own	½F	4.50	Sp	TA	Ext-Rw	DiM	Int-Rw	Own	Own	SC	SC	OC	Overland 91-92
Own	Eng	m-Spi	Own	½F	4.66	Sp	TA	Ext-Rw	DiM	Int-Rw	Own	Own	½E	½E	PG	Packard S-6
Own	Eng	m-Spi	Own	½F	4.70	Sp	TA	Int-Fw	DiM	Int-Rw	Own	Own	½E	½E	PG	Packard S-8
War	Eng	m-Mec	Tim Spec	½F	4.90	Sp	Sp	Ext-Rw	DiM	Int-Rw	Tim	Gem	½E	½E	PG	Paige 6-70
Own	Eng	m-Spi	Tim Spec	½F	4.66			Ext-Fw	Hyd	Int-Rw	Tim	Gem	½E	½E		Peerless 6
Own	Eng	m-Spi	Tim 5320	¾F	4.90	TT	TA	†Ext-Rw	DiM	Int-Rw	Tim	Gem	½E	½E	PG	Peerless 66
Own	SeU	{f-Goo / m-Spi}	Own	½F	4.29	Sp	TA	†Ext-Rw	DiM	Int-Rw	Own	Own	½E	½E	PG	Pierce-Arrow 33
Mun	Eng	m-Blo	Col	¾F	4.67	Sp	Sp	Ext-Rw	DiM	Int-Rw	Col	Ros	½E	½E	OC	Pilot 6-56
Own	Eng	m-Spi	Tim 5512	½F	4.58	Sp	Sp	†Ext-Rw	DiM	Int-Rw	Tim	Own	½E	½E	PG	Premier 6-D
B-L	Eng	m-Spi	Tim 5302	½F	5.40	Sp	Sp	Ext-Rw	DiM	Int-Rw	Tim	Jac	½E	½E	OC	R. & V. Knight H
Own	SeU	{m-Own / f-Own}	Own	½F	4.70	Sp	TA	Ext-Rw	DiM	Int-Rw	Own	Own	½E	½E	PG	Reo T-6
B-L	Eng	m-Spi	Sta	¾F	3.44	TT	TT	Ext-Rw	DiM	Int-Rw	Sta	Gem	½E	½E	PG	Revere M
Own	Eng	m-Nec	Own	¾F	4.60	Sp	Sp	Int-Rw	DiM	Ext-DS	Own	Gem	½E	½E	PG	Rickenbacker C
B-L	Eng	f-M & E	Tim 5310	¾F	4.63	Sp	Sp	Ext-Rw	DiM	Int-Rw	Tim	Jac	½E	Can	PG	Roamer 4-75E
Ful	Eng	f-M & E	Tim 5310	¾F	4.45	Sp	Sp	Ext-Rw	DiM	Int-Rw	Tim	Jac	½E	Can	PG	Roamer 6-54E
Mun	Eng	f-Sne	Sal	½F	5.10	RR	TT	Int-Fw	DiM	Int-Fw	Sal	Dit	½E	½E	PG	Rollin
Own	SeU	m-Own	Own	FF	3.72	TT	TT	Int-Rw	DiM	Int-Rw	Own	Own	½E	Can	PG	Rolls Royce
B-L	Eng	m-Cle	Tim 5712	FF	4.91	Sp	TA	Ext-Rw	DiM	Int-Rw	Tim	Ros	½E	½E	PG	Sayers G-L
Own	Eng	m-Uni	Pen	FF	4.50	Sp	Sp	Int-Rw	DiM	Ext-Rw	Pen	Dit	½E	½E	PG	Seneca 50-51
No		None	Own	½F	1.50	Sp	Sp	†Ext-Rw	DiM	Int-Rw	Sta	Ros	½E	FE	PG	Stanley 740
War	SeU	m-Spi	Tim Spec	¾F	4.87	Sp	Sp	Ext-Rw	DiM	Int-Rw	Tim	War	½E	½E	OC	Star
Own	Eng	f-Cli	Own	½F	4.50	Sp	TA	Ext-Rw	DiM	Int-Rw	Own	Own	FE	Can	OC	Stearns-Knight 4
Own	Eng	f-Cli	Own	½F	4.70	Sp	TA	Ext-Rw	DiM	Int-Rw	Own	Own	½E	Can	OC	Stearns-Knight 6
Mec	Eng	m-Mec	Tim {5310 / 5140}	½F	5.30 / 5.10	Sp	Sp	Ext-Rw	DiM	Ext-DS	Tim	Gem	½E	½E	PG	Stephens 20-104
Ful	Eng	f-Cli	Tim 5200	½F	4.56	Sp	Sp	Ext-Rw	DiM	Int-Rw	Tim	Ros	½E	½E	PG	Sterling-knight B-6
Own	SeU	f-The	Own	½F	5.00	Sp	Sp	Ext-Rw	DiM	Int-Rw	Own	Own	½E	½E	OC	Studebaker L-6
Own	SeU	m-Spi	Own	½F	4.33	Sp	Sp	Ext-Rw	DiM	Int-Rw	Own	Own	½E	½E	PG	Studebaker S-6
Own	SeU	m-Spi	Own	½F	3.71	Sp	Sp	Ext-Rw	DiM	Int-Rw	Own	Own	½E	½E	PG	Studebaker B-6
War	Eng	m-Mec	Tim Spec	½F	4.45	Sp	TA	†Ext-Rw	DiM	Int-Rw	Tim	Gem	½E	½E	PG	Stutz 695
Own	SeU	m-Har	Own	¾F	3.75	TT	TT	Int-Rw	DiM	Int-Rw	Sta	Gem	½E	½E	OC	Stutz KLDH
War	Eng	m-Mec	Tim Spec	½F	4.66	Sp	Sp	Ext-Rw	DiM	Int-Rw	Tim		½E	½E	PG	Stutz 690
War	Eng	f-	Sal	¾F	5.10	Sp	Sp	Int-Fw	DiM	Ext-DS	Sal		½E	½E	PG	Templar 6
Dur	Eng	m-Thi	Own	½F	4.70	Sp	Sp	Ext-Rw	DiM	Int-Rw	Col	Gem	½E	½E	PG	Velie 58
B-L	Eng	m-Pet	Tim 5302	½F	4.45	Sp	Sp	†Ext-Rw	DiM	Int-Rw	Tim	Gem	½E	½E	PG	Westcott D-48
War	Eng	m-Pet	Col 33001	½F	4.90	Sp	Sp	†Ext-Rw	DiM	Ext-DS	Col	Gem	½E	½E	PG	Westcott C-44
	Eng							†Int-Fw	DiM	Int-Fw						Westcott 60
Own	Eng	m-Mec	Own	½F	4.40	Sp	TA	Ext-Rw	DiM	Int-Rw	Own	Own	½E	½E	PG	Wills Ste Claire A & B-68
Own	Eng	f-Own	Own	¾F	4.45	Sp	Sp	Ext-Rw	DiM	Int-Rw	Own	Own	½E	½E	PG	Willys-Knight 64-67
B-L	Eng	m-Uni	Eat 420	½F	4.68	Sp	TA	Ext-Rw	DiM	Int-Rw	Eat	Own	½E	½E	PG	Winton 40

Kel—Kelsey
Kni—Knight
L—L Head
Lav—Lavine
Lon—Long
Lyc—Lycoming
M—Magneto
m—Metal
Mar—Marvel
Mec—Mechanics
MD—Multiple Dry Disk
M&E—Merchant and Evans
Mid—Midvale
MO—Multiple Disk in Oil
Mon—Monsen
Mun—Muncie
N-E—North-East
Nor—Northway
O—Optional
O-C—Owen-Connecticut
OC—Oil Cups
O-D—Owen-Dyneto
Par—Parrish
P&B—Parish & Bingham
Pen—Penfield
Pet—Peters
PG—Pressure Gun
PrCs—Pressure to all crankshaft and connecting rod bearings, splash to other parts
Pre—PrestoLite
Pre—Pressure
Pu—Pump
RA—Unit with Rear Axle
Ray—Rayfield
Rem—Remy
Roc—Rockford
Ros—Ross
R&T—Radius Rods and Torque Tube
Rub—Rubsam
SA—Semi Automatic
Sal—Salisbury
Sav—Savage
Sci—Scintilla
SC—Special Cantilever
Sch—Schebler
Sco—Scoe
SeU—Separate Unit
Sl—Sleeve Type
Smi—Smith
Sne—Snead
S&N—Screw & Nut
SP—Single Plate
Sp—Springs
Spi—Spicer
Spl—Splitdorf
SO—Single Plate in Oil
Spec—Special
Spla—Splash
SpPr—Pressure to main crankshaft bearings only, splash to connecting rods and other parts
Sta—Standard
SS—Semi Steel
Ste—Stewart
Str—Stromberg
T—Valves Opposite
T½—Transverse Elliptic
TA—Torque Arm
The—Thermoid
Thi—Thiemer
Til—Tillotson
Tim—Timken
TS—Thermo Siphon
TT—Torque Tube
Uni—Universal
Vac—Vacuum
W—Wire
Wag—Wagner
War—Warner
Wei—Weidely
Wes—Westinghouse
W&G—Worm & Gear
Wil—Willard
Wis—Wisconsin
W&S—Worm & Sector
W&W—Worm & Wheel
Zen—Zenith

However, should the reader care to, he will find much of interest in taking all the wheelbase dimensions, for example, add them and then divide by the number of cars. This will give him the wheelbase of the car representing, in a sense, the average American car. In the same way he can take the bore and stroke figures, gear ratio, type of springs, etc.

We might also suggest that those readers who care to figure these averages get on the good side of the bookkeeper in order to borrow the adding machine. A slide rule comes in handy also, if you know how to use it.

Mechanical Specifications for 1924 Motor Trucks

For specially designed Motor Bus chassis see pages 66 and 67

Those Truck Chassis which are sold and recommended for Passenger Transportation are designated in the following table by the ‡‡ reference sign in front of the name.

(¾ TONS AND UNDER)

MAKE AND MODEL	GENERAL				ENGINE			ELECTRICAL SYSTEM			TRANS-MISSION		REAR AXLE						
	Tons Capacity	Wheelbase (Ins.) (Standard)	Tires Type and Size (Ins.) Front	Tires Type and Size (Ins.) Rear	Make and Model	No. of Cylinders Bore and Stroke (Ins.)	Carburetor Make	Ignition System Make	Ignition System Current Sources	Generator and Starter Make	Clutch Make	Gearset Make	Make and Model	Final Drive	Front Axle Make	Steering Gear Make	Wheels Make	Price	Chassis Weight (Lbs.)
†Commerce 23	¾	126	P-32x4½	P-32x4½	Cont	N 4-3¾x5	Zeni	Bosch	B	Bijur	Det	Det	Sal D-16	S B.	Sal	Jac	Bud		3000
Dodge Bros 1924	¾	116	P-32x4	P-32x4	Own	4-3⅞x4½	Stew	N-E	B	N-E	Own	Own	Own	S B.	Own	Own	Kel	730	2212
†Overland 23	½	100	P-30x3½	P-30x3½	Own	4-3½x4	Till	Conn	B	A-L	B & B.	Own	Own	S B.	Own	Own	Hay		1456
Rainier 1924 R-31	¾	125	P-35x5	P-35x5	Cont	N 4-3¾x5	Zeni	Eisem	M	‡Bosch a	B-L	B-L	Tim 6250	Wo.	Tim	Lav	Jon		2500
Ruggles 1924 15	¾	122	P-32x4½	P-32x4½	H-S	30 4-3½x5	Zeni	Bosch	B	Bosch	M E.	Ful	Col 3000D	S B.	Col	Jac	Nort		2400
Star 23	¾	102	P-30x3½	P-30x3½	Cont	Spec 4-3½x4¼	Till	A-L	B	A-L	Own	War	Tim Spec	S B.	Tim			405	
†White 15	¾	133½	P-34x5	P-34x5	Own	4-3¾x5½	Zeni		M	‡L-N b.	Own	Own	Own	S B.	Own	Own		2400	3225

(1, 1¼, 1½, 1¾ TONS)

For specially designed Motor Bus chassis see pages 66 and 67

Those Truck Chassis which are sold and recommended for Passenger Transportation are designated in the following table by the ‡‡ reference sign in front of the name.

MAKE AND MODEL	GENERAL				ENGINE			ELECTRICAL SYSTEM			TRANS-MISSION		REAR AXLE						
	Tons Capacity	Wheelbase (Ins.) (Standard)	Tires, Type and Size (Ins.) Front	Tires, Type and Size (Ins.) Rear	Make and Model	No. of Cylinders, Bore and Stroke (Ins.)	Carburetor Make	Ignition System Make	Ignition System Current Sources	Generator and Starter Make	Clutch Make	Gearset Make	Make and Model	Final Drive	Front Axle Make	Steering Gear Make	Wheels Make	Price	Chassis Weight (Lbs.)
‡‡Acme 20	1	129	P-34x5	P-34x5	Cont	N 4-3¾x5	Rayf	Eise	M	§Bosch	B & B.	Cot	Tim 6250	Wo.	Tim	Ros	Bim		3050
‡‡Acme 30	1½	129	S*-34x3½	S*-34x5	Cont	J-4 4-3¾x5	Zeni	Eise	M	‡Delco	B & B.	Cot	Tim 6352	Wo.	Tim	Ros	Bim		3406
‡‡Armleder 21	1½	148	S*-34x3½	S*-34x6	Buda	GTU 4-4 x5¼	Zeni	Bosch	M	‡West	Ful	Ful	Tim 6460	Wo.	Tim	Ros	St. M.	2550	4400
‡‡Armleder 40B	1½	148	S*-34x3½	S*-34x6	Buda	HTU 4-4½x5½	Zeni	Bosch	M	‡West	B-L	B-L	Tim 6460	Wo.	Tim	Ros	St. M.	2900	4600
‡‡Armleder 40C	1½	148	S*-34x3½	S*-34x6	Cont	C4 4-4½x5¼	Zeni	Bosch	N	None	B-L	B-L	Tim 6460	Wo.	Tim	Ros	St. M.	2900	4600
Atterbury 20R	1½–2	144	S*-34x4	S*-34x6	Cont	J-4 4-3¾x5	Zeni	Eise	M	‡Delco	Ful	Ful	Tim 6460	Wo.	Tim	Ros	Arc	2475	4500
‡‡Autocar 21F	1½–2	97	S*-34x4	S*-34x6	Own	2-4¾x4½	Stro	Bosch	M	‡L-N§§	Own	Own	Own	DR.	Own	Ros	Hoo	2200	3800
Autocar 21G	1½–2	120	S*-34x4	S*-34x6	Own	2-4¾x4½	Stro	Bosch	M	‡L-N§§	Own	Own	Own	DR.	Own	Ros	Hoo	2300	3900
Available JH1½	1½	145	S*-36x3½	S*-36x5	Herc	0 4-4 x5	Zeni	Bosch	M	‡Bosch	B-L	B-L	Tim 6450	Wo.	Tim	Ros	St. M.	2450	4000
‡‡Avery	1–1¼	129	P-34x5	P-34x5	Own	6-3 x4	Stro	K-W	M	West	Own	Own	Tor OX2	I G.	Own	Ros	St M.		2600
†Bessemer G	1	124	P-35x5	P-35x5	Cont	N 4-3¾x5	Stro	Bosch	M	Bijur	Ful	Ful	Tor A	I G.	Shu	Ros	Sch	1450	2000
‡‡Bethlehem KN	1	125	P-35x5	P-35x5	Own	4-3½x5	Zeni	Bosch	M	G & D	B & B.	Det	Eat 1000	S B.	Eato	Lav	Jon	1385	2560
Bridgeport A	1½	144	S*-34x4	S*-34x6	Buda	WTU 4-3¾x5⅛	Zeni	Eise	M	‡Bosch	B-L	B-L	Tim 6460	Wo	Shu	Ros	Jon	2350	3800
Brockway E	1	135	P-33x5	P-33x5	Wisc	SU 4-4 x5	Zeni	Split	M	L-N	B-L	B-L	Col 5200	S B.	Col	Gem	Hoo		2900
Brockway S	1½–2	140	S-36x4	S-36x6	Wisc	SU 4-4 x5	Zeni	Split	M	‡L-N	B-L	B-L	Tim 6460	Wo.	Tim	Gem	Hoo		4050
‡‡Chevrolet	1	120	P-31x4	P-34x4½	Own	4-3 1/8x4	**Zeni	Remy	B	Remy	Own	Own	Own	S B.	Own	Own	Hay	550	1915
Clinton 20	1–1½	150	P-34x5	P-34x5	Buda	WTU 4-3¾x5½	Zeni	Apol	M	Bosch	B-L	B-L	Tim 6250	Wo.	Tim	Ros	St M.	2070	3450
Clinton 45	1½–2	163	S*-34x4	S*-34x4	Buda	GTU 4-4 x5¼	Zeni	Apol	M	Bosch§§	B-L	B-L	Tim 6460	Wo	Tim	Ros	St M.	2480	4875
Clydesdale 10A	1½	153	P-34x5	P-34x5	Cont	N 4-3¾x5	Zeni	Bosch	B	Bosch	B & B.	B-L	Tim 6250	Wo.	Sta	Ros			3100
Clydesdale 10	1½	154	P-34x5	P-34x5	Cont	N 4-3¾x5	Zeni	Bosch	B	Bosch	B & B.	B-L	Tim 5511	Wo.	Sta	Ros			3100
†Commerce 9	¾–1¼	....	P-33x5	P-33x5	Cont	N 4-3¾x5					Det	Det	Sal D16	S B.					
†Commerce 14	1½	....	S*-36x3½	S*-36x5	Cont	J-4 4-3¾x5					B-L	B-L	Tim	Wo.					
Corbitt E	1	130	S*-34x3½	S*-34x4	Cont	N 4-3¾x5	Stro	Eise	M	‡Bijur	B-L	B-L	She W-1002	Wo	She	Ros	Bim	1480	3730
‡‡Corbitt S	¾–1	130	P-34x4½	P-34x4½	H-S	30 4-3½x5	Stro	Split	M	Dyne	B-L	B-L	She W-1002	Wo.	She	Ros	Bim	1250	3420
Corbitt D	1½	140	S*-34x3½	S*-34x5	Cont	J-4 4-3¾x5	Stro	Eise	M	‡Bosch	B-L	B-L	She W-1501	Wo	She	Ros	Bim	2170	4150
‡‡Day-Elder AN	1–1½	128	P-35x5	P-35x5	Buda	WTU 4-3¾x5½	Zeni	Eise	M	‡Bosch C	B-L	B-L	Tim 6352	Wo.	Col	Gem	Van		3600
Dearborn E	1	132	P-35x5	P-35x5	Buda	WTU 4-3¾x5⅛	Stro	Conn	B	Bosch	Ful	Ful	Wis 800-G	Wo	Tor	Ros	St M	1465	3280
†Denby 31	¾–1½	130	P-34x4½	P-34x4½	Cont	7-N 4-3¾x5	Stro	Eise	M	‡Remy	Ful	Ful	Cla B-300	S B.	She	Ros	Motor	1485	2840
‡‡Diamond T 75	¾–1	130	P-33x5	P-33x5	Herc	OX 4-4 x5	Zeni	Apol	M	§§A-L	Cov	Cov	Col 52021	S B.	Col	Gem	Motor		2825
Diamond T 03	1–1½	132	S*-36x3½	S*-36x4	HinkHAA700	4-3¾x5¼	Stro	Bosch	M	None	Cov	Cov	Own	Wo	Own	Gem	Sch		4050
Diamond T T	1½	154	S-36x3½	S-36x5	HinkHAA700	4-3¾x5¼	Stro	Bosch	M	‡Opt	Cov	Cov	Tim 6460	Wo	Tim	Gem	Sch		4150
Dorris K-2	1	Opt.	P-33x5	P-33x5	Own	4-4 x5½	Stro	Bosch	M	West	Own	War	Tim 3542	S B.	Tim	Ros		2490	2000
Duplex GH	1½	138	P-35x5	P-36x6	Buda	WTU 4-3¾x5⅛	Zeni	West	B	West	Cov	Cov	She W1501	Wo.	She	Ros	Mot		3700
Fageol	1½–2	136	S*-34x4	S*-34x6	Wauk	YA 4-3¾x5¼	Zeni	Split	M	‡Opt	B-L	Own	Tim 6461	Wo	Sta	Ros		3000	4700
†Federal R-2	1	132	P-33x5	P-33x5	Cont	J-4 4-3¾x5	Zeni	Eise	M	Remy	B & B.	Det	Tim 6250	Wo.	Tim	Gem			2950
†Federal S21-22	1½	144	P-36x3½	P-36x5	Cont	J-4 4-3¾x5	Zeni	Eise	M	§§Remy	B & B.	Det	Tim 6252	Wo.	Own	Gem			3850
‡‡Ford T	1	123	P-30x3½	P-32x4½	Own	4-3¾x4	Own	Own	M	‡Own	Own	Own	Own	S B.	Own	Own	Own	370	1440
‡‡GMC K-16	1	132	P-34x5	P-34x5	Own	4-3½x5½	Marv	Eise	M	Remy	Own	Own	Own	S B.	Own	Hac			3250
†Garford 15	1	132	P-34x5	P-34x5	Buda	MU 4-3⅝x5⅛	Stro	A-K	B	A-K	B & B.	Own	Stan 602	Wo	Own	Gem			3500
Garford 25B	1½	135	S*-36x4	S*-36x5	Buda	WU 4-3¾x5⅛	Stro	Split	M	‡A-dK	Own	Own	Tim 6460	Wo	Own	Ros			4000
†Gary F	1	132	S-36x3½	S-36x5	Buda	WU 4-3¾x5½	Mast	Eise	M	‡West	Ful	Ful	Tim 6352	Wo	Tim	Ros			3500
‡‡*Golfredson* 40	1½–2	144	P-36x6	P-38x7	Buda	GBU 4-4 x5¼	Zeni	Bosch	M	A-K	B-L	B-L	Tim 6460	Wo	Tim	Gem	Mic		4000

(1, 1¼, 1½, 1¾ TONS—Continued)

For specially designed Motor Bus chassis see pages 66 and 67

Those Truck Chassis which are sold and recommended for Passenger Transportation are designated in the following table by the ‡‡ reference sign in front of the name.

MAKE AND MODEL	GENERAL				ENGINE			ELECTRICAL SYSTEM			TRANSMISSION		REAR AXLE						
	Tons Capacity	Wheelbase (Ins.) (Standard)	Tires, Type and Size (Ins.) Front	Tires, Type and Size (Ins.) Rear	Make and Model	No. of Cylinders, Bore and Stroke (Ins.)	Carburetor Make	Ignition System Make	Ignition System Current Sources	Generator and Starter Make	Clutch Make	Gearset Make	Make and Model	Final Drive	Front Axle Make	Steering Gear Make	Wheels Make	Price	Chassis Weight (Lbs.)
‡‡*Gotfredson*	*20*	1	131	P-34x5	P-34x5	Buda	WTU	4-3¾x5½	Zeni	Bosch	M	A-K	B-L	B-L	Tim	6250	Wo	Tim	Gem			3250
†*Gotfredson*	*20*	¾-1	131	P-34x5	P-34x5	Buda	WTU	4-3¾x5½	Zeni	Bosch	B	A-K	B-L	B-L	Tim	6250	Wo	Tim	Gem	Day	2275	3250
‡‡Graham	BA	1	140	P-33x4½	P-34x5	Dod	1924	4-3⅞x4½	Stew	N-E	B	N-E	Dod	Dod	Own		S B	Dod	Dod	Kel	1265	2835
‡‡Graham	CA	1½	140	P-33x4½	P-36x6	Dod	1924	4-3⅞x4½	Stew	N-E	B	N-E	Dod	Dod	Own		S B	Dod	Dod	Kel	1325	2910
‡‡Gramm-Pioneer	10	1¼	129	P-33x5	P-33x5	Lyc	CT	4-3¾-5	Zeni	Conn	B	A-L	Mun	Mun	Sal	E-1483	S B	Sali	Ros	Day	1245	2370
Gramm-Pioneer	15	1½	138	S*-36x3½	S-36x5	Cont	N	4-3¾x5	Stro	N-E	B	‡N-E	Ful	Ful	Cha1-D	1-D	I G	Col	Ros	Bim	1750	3950
Gramm-Pioneer	65	1½	138	S*-36x3½	S*-36x5	Cont	J-4	4-3¾x5	Stro	N-E	B	N-E	Ful	Own	Stan	603	Wo	Col	Ros	Bim	2250	4250
Gray		1	120	P-30x3½	P-32x4½	Own		4-3⅝x4	Scoe	West	B	West	Own	Det	Tim	513	S B	Tim	Own	Kel	575	1510
†Hendrickson	O	1½	....	S-36x4	S-36x5	Buda	WTU	4-3¾x5½	Stro	Split	M	None	Ful	Ful	Tim	6460	Wo	Tim	Ros	Mea	2525	4250
‡‡Indiana	11	1	128¾	P-34x5	P-34x5	Herc	OX	4-4 x5	Zeni	A-L	B	A-L	B & B	Mun	Cla	B-307	S B	Sal	Ros	Ind		3100
‡‡Indiana	15	1½-2	146	S*-34x3½	S*-34x6	Herc	OX	4-4 x5	Zeni	Eise	M	A-L	B & B	B-L	She	W1501	Wo	She	Ros			4250
International	S	1	124½	P-32x4½	P-32x4½	Lyc	KB	4-3½x5	Ensi	Conn	B	A-L	Mun	Mun	Tor	750	I G	Tor	CAS	Own		5260
International	21	1	115	S*-36x3½	S*-36x3½	Own		4-3½x5¼	Ensi	Bosch		Own	Own	Own	Own		I G	Own	Own	Own		3030
†Kalamazoo	T	1	134	P-34x5	P-34x5	Herc	0	4-4 x5					M-E	Cam	Fli	70-BA-10	S B	Fli	Lav		1685	3600
†Kalamazoo	G1	1½-2	144	S-34x4	S-34x5	Cont	N	4-3¾x5	Stro	Eise*	M	Dyn	Ful	Ful	Wis	800-H	Wo	Shu	Ros	Bim	2100	4450
†Kelly-Springfield	K-340	1-1½	144	S-36x3½	S-36x6	Own		4-3¾x5¼	Zeni	Eise	M	Delco	B & B	Cov	Own		Wo	Own	Gem	St M		4670
Kissel		1	140	P-34x5	P-34x5	Own		4-3⅞x5½	Stro	Remy	B	Remy	War	War	Tim	6352	Wo	Tim	Jac	St M		3070
Kissel		1½	152	S*-36x3½	S*-36x6	Own		4-3⅞x5½	Stro	Eise	M	‡Remy	War	War	She	W-1501	Wo	She	Jac	St M		4100
Krebs	J-24	1	156	P-34x5	P-34x5	Cont	J-4	4-3¾x5	Zeni	Bosch	M	‡Bosch	B-L	B-L	Tim	6250	Wo	Tim	Ros	Van		3230
Krebs	K-45	1½	160	S*-36x4	S*-36x7	Cont	K4	4-4½x5¼	Zeni	Bosch	M	‡Bosch	B-L	B-L	Tim	6460	Wo	Tim	Ros	Smi		4730
‡‡Larrabee	X2	1¼	138	P-34x5	P-34x5	Cont	8R	6-3⅜x4½	Zeni	Bosch	B	Bosch	B-L	B-L	Sal	1480E	S B	Sal	Gem	Ind	1785	3250
Maccar	EX	1¼	132	P-34x5	P-34x5	Wisc	SU	4-4 x5	Zeni	Bosch	M	Bosch	B-L	B-L	Sal	1526E	SB	Sal	Ros	Van		3400
Maccar	L1	1½	150	S*-36x4	S*-36x6	Wisc	TAU	4-4 x6	Zeni	**Stro	Eise	M	‡Bosch	B-L	B-L	Tim	6460	Wo	Tim	Ros	Day		4900
‡‡Mack	AB	1½	146¾	S*-36x4	S*-36x3½d	Own		4-4 x5	Zeni	Split	M	‡L-N	Own	Own	Own		D R	Own	Own	Day	3450	5300
‡‡Mack	AB	1½	146¾	S*-36x4	S*-36x3½	Own		4-4 x5	Zeni	Split	M	‡L-N	Own	Own	Own		Cha	Own	Own	Day	3000	5050
†*Maplelcaf*		1½	144	P-34x5	P-36x6	Hink	HA300	4-3¾x5¼	Stro	Eise	M	‡West	Ful	Ful	She	W1501	Wo	She	Ros	Smi	3000	4000
Mason		1	131	P-34x5	P-34x5	Herc	4-4	x5	John	A-L	B	A-L	Hoo	War	Fli	Spec	S B	Fli	Lav		1295	2950
Master	21	1½	142	S-34x5	S-34x6	Buda	GTU	4-4 x5½	Zeni	Eise	M		Ful	Ful	Tim		Wo	She	Ros	Pru		4300
Master	11	1¼	132	P-33x5	P-33x5	Buda	WTU	4-3⅜x5½	Zeni	West		West	Ful	Ful	Tim	3511	S B	Tim	Ros	St M		3200
‡‡Maxwell	50	1½	124	P-35x5	P-35x5	Own		4-3⅝x4½	Stew	Remy	B	Remy	Mec	Own			Wo	Own	Own	Kel	1097	2390
‡‡Menominee		1	132	P-35x5	P-35x5	Wisc	SU	4-4 x5	Zeni	Bosch	M	Bosch	B & B	Det	Col	52000	S B	Col	Lav	Bim	1650	2925
Menominee	HT	1¼	130	S*-34x3½	S*-36x5	Wisc	CAU	4-3¾x5	Stro	Eise	M	§§Eise‡	Del	Cot	Wis	800G	Wo	Shu	Ros	Bim	2000	3525
Menominee	H	1½	144	S*-36x3½	S*-36x5	Wisc	E	4-4 x5	Stro	Eise	M	§§Eise‡	Del	Cot	Wis	800H	Wo	Shu	Ros	Bim	2475	4220
National	*FA*	1	136	P-35x5	P-35x5	Wauk	BUX	4-3¾x5¼	Zeni	Eise	M	‡N-E	B-L	B-L	Tim	6352	Wo	Tim	Ros	Dom		3350
National	*6A*	1½	140	S*-34x4	S*-34x5	Wauk	BUX	4-3¾x5¼	Zeni	Eise	M	‡N-E	B-L	B-L	Tim	6460	Wo	Tim	Ros	Dom		3850
Noble	A75	1	130	P-34x4½	P-34x4½	Buda	WTU	4-3¾x5½	Zeni	Eise	M	Bosch	Ful	Ful	Cla	B300	S B	She	Ros	Bim	1395	3080
Noble	A21	1½	144	P-34x5	P-34x5	Buda	WTU	4-3¾x5½	Zeni	Eise	M	Bosch	Ful	Ful	She	W1501	Wo	She	Ros	Bim	1890	3710
‡‡Oldsmobile	T	1	128	P-33x5	P-33x5	Own		4-3 1/16x5¼	Zeni	Remy	B	A-L	B & B	Mun	Tor	OX2L	I G	Tor	Jac	Mot	1095	2850
‡‡Patriot	7R	1	129	P-35x5	P-35x5	Cont	N	4-3¾x5	Stro	Bosch	B	Bosch e	B & B	Cov	Tim	6250	Wo	Fli	CAS	Bim	1350	2900
Rainier	R29	1	133	S*-34x3½	S*-34x4	Cont	N	4-3¾x5	Zeni	Eise	M	‡Bosch a	B-L	B-L	Tim	6250	Wo	Tim	Lav	Jon		2700
Rainier	R36	1½	147	S*-34x3½	S*-34x5	Cont	J-4	4-3¾x5	Zeni	Eise	M	‡Delco	B-L	B-L	Tim	6460	Wo	Tim	Ros	Jon		3900
‡‡Reo	F	1¼	128	P-33x5	P-33x5	Own		4-4½x4½	John	N-E	B	N-E	Own	Own	Own		S B	Own	Own	Mot	1185	2655
Republic	75	1¼	122	P-33x5	P-33x5	Lyc	CT	4-3¾x5	Stro	Bosch	B	Bosch	Ful	Ful	Tor		I G	Tor	Jac	Nor	1395	2700
†Rowe	CW	1½	133	P-36x6	P-36x6	Wisc	CAU	4-3¾x5	Zeni	Bosch	M	†Opt	B-L	B-L	She	W1501	Wo	She	Ros	Hoo		3820
‡‡Ruggles	20R	1¼	128	P-34x5	P-34x5	Herc	0	4-4 x5	Zeni	Remy	B	Remy	B-L	B-L	Col	52000	S B	Col	Jac	Nor		2850
‡‡Rumely	A	1½-2	144	S*-36x3½	S*-36x5	Buda	CTU	4-3¾x5¼	Stro	Spli	M	‡Bosch	Ful	Ful	She	W1501	Wo	Shu	Gem		2150	4050
†Sanford	W10	¾ 1¼	140	P-33x5	P-33x5	Cont	8R	6-3⅜x4½	Stro	Conn	B	Dyn	B & B	B-L	Sal	D	S B	She	Gem	Hoo		
†Sanford	15	1½	132	S*-36x3½	S*-36x5	Cont	N	4-3¾x5	Zeni	Eise	M	‡Dyn	B-L	B-L	She	W1501	Wo	She	Ros	Ind†	2150	3850
‡‡Schacht	1½H	1½	144	S*-36x3½	S*-36x7	Wisc	SU	4-4 x5	Zeni	Bosch	M	None	Ful	Ful	Wis	60D	D R	Shu	Ros	St M	2500	4500
Selden	30	1½	137	S-34x3½	S-34x5	Cont	J-4	4-3¾x5	Stro	Eise	M	None	B-L	B-L	Tim	6460	Wo	Tim	Lav	Arc	2375	4250
‡‡Service	25	1¼	132	P-34x5	P-34x5	Buda	WTU	4-3¾x5½	Zeni	Remy	B	Remy	B-L	B-L	Eat	100	S B	Shu	Ros	Bim		3500
Service	33	1-1½	146	S*-34x3½	S*-34x6	Buda	GBU	4-4 x5¼	Stro	Eise	M	‡Remy	B & B	B-L	Tim	6352	Wo	Shu	Ros	Sta		4695
‡Signal	NF	1¾	132	P-34x5	P-36x6	Cont	JA	4-3¾x5	Stro	Eise	M	‡Delco	B-L	B-L	Tim	6352	Wo	Tim	Ros	St M		3575
Standard	75	1¼	134	P-33x5	P-33x5	Cont	N	4-3¾x5	Stro	Eise	M	None	B-L	B-L	Tim	6250	Wo	Tim	Ros	Dia	1330	3000
Standard	IK	1½	144	C*-34x3½	C*-36x4	Cont	N	4-3¾x5	Stro	§§Eise‡	M	Bosch	B-L	B-L	Tim	6352	Wo	Tim	Ros			3460
Sterling		1½	142	S*-36x3½	S*-36x5	Wauk	FU	4-4 x5¾	Stro	Eise	M	None	B-L	B-L	Tim	6460	Wo	Tim	Ros	Pru	3240	4700
Stewart	15	1	130	P-35x5	P-35x5	Buda	MU	4-3⅝x5½	Zeni	Remy	B	Remy	Ful	Ful	Cla	AW	I G	Col	Ros	Fir	1495	3140
Stewart	16	1	130	P-34x4½	P-34x4½	Lyc	CT	4-3¾x5	Stro	Eise	M		B-L	B-L			S B		Ros	St M	1095	2840
Stewart	9	1½	140	S-34x3½	S-34x6	Cont	N	4-3¾x5	Zeni	Remy		Remy	Ful	Ful	Cla	1D		Col	Gem	Fir	1870	3680
†Stoughton	C	¾-1	131	P-34x4½	P-34x4½	Midw	410	4-3⅜x4½	Zeni	Remy	B	Remy	Del	Cam	Col	52000	S B	Col	Lav	Roy	1165	2480
†Stoughton	A	1½	130	P-34x5	P-34x5	Wauk	BUX	4-3¾x5¼	Stro	Eise	M	‡Dyn	B-L	B-L	She	W1001	Wo	She	Lav	Roy	2400	3300
†Stoughton	B	1½	140	S-36x3½	S-36x5	Wauk	BUX	4-3¾x5¼	Stro	Eise	M	‡Dyn	B-L	B-L	She	W1501	Wo	She	Lav	Roy	2150	3730
†Tiffin	GW	1½-2	135	S-36x3½	S-36x5	Cont	G4	4-4½x5¼	Sche	Bosch	M	‡Eise e	Ful	Ful	She	W103	Wo	She	Ros	Smi	2100	3750
Traffic		1½	128	P-35x5	P-35x5	Cont	N	4-3¾x5	Cart	Bosch	M	Bosch	Cov	Cov	Rus	34	I G	Own	Own	Day	1750	2325
‡‡Transport	15	1	128	P-32x4½	P-32x4½	Cont	N	4-3¾x5	Zeni	Remy	B	Remy	Ful	Ful	Col	51000	S B	Col	Lav	Mot		2950
Transport	20	1½	140	S*-34x3½	S*-34x5	Buda	WTU	4-3¾x5½	Zeni	Eise	M	§Remy	Ful	Ful	Cla	1D	I G	Col	Jac	Mot		3800
Traylor	B	1½	140	S*-34x3½	S*-34x6d	Buda	WTU	4-3¾x5½	Zeni	Spli	M	§§West	Cov	Cov	She	W1501	Wo	She	Ros	Sch	2390	4300
†Triangle	AA	1	123	P-34x4½	P-34x4½	H-S	7000	4-3½x5	Stro	N-E	B	N-E	Ful	Ful	Cla	B360	S B	Tor	Gem	Nor	1285	2300
†Triangle	A	1½-2	144	S*-34x4	S*-34x7	Wauk	BUX	4-3¾x5¼	Stro	Eise	M	‡Eise b	Ful	Ful	Cla	1D	I G	Col	Gem	Nor	1985	3750
Ultimate	A	1½	140	S-36x3½	S-36x6	Buda	ETU	4-4½x5½	Stro	Eise	M	Bosch	B-L	B-L	She	D1201	Wo	She	Ros	Jon	3200	4500
‡‡United	15	¾-1	128	P-32x4½	P-32x4½	H-S	30	4-3½x5	Zeni	Bosch	B	Bosch	B & B	Ful	Col	31000	S B	Col	Lav			2425
‡‡United	30	1½	148	P-34x5	P-34x5	Herc	0	4-4 x5	Zeni	Bosch	B	Bosch	B-L	B-L	Col	52000	S B	Shu	Lav			3000
‡‡United States	U	1¼	138	P-34x5	P-34x5	Buda	WTU	4-3⅜x5½	Stro	Bosch	B	Bosch	Ful	Ful	Cla	B360	S B	Shu	Lav	Sch	1875	3400
‡‡United States	N	1½	144	S*-36x3½	S*-36x5	Buda	WTU	4-3¾x5½	Stro	Bosch	B	‡Bosch	Ful	Ful	Cla	1D	I G	Shu	Lav	Sch	2275	3750
Velie	52	1½-2	141	S*-36x4	S*-36x6	Herc	CU2	4-4¾x5½	Stro	Berl	M	‡West	B & B	Own	Tor	C2	I G	Col	Ros	Mu†	1785	3700
Veteran	*E*	1½	186	P-34x5	P-34x5	Buda	CTU	4-3¾x5¼	Zeni		M	None	B & B	Cot	She	W1501	Wo	She	Ros	Smi	2699	....
‡‡Victor	25	1¼	131	P-33x5	P-33x5	Herc	0	4-4 x5	Zeni	A-L	B	A-L	Ful	Ful	Col	52000	S B	Col	Lav		1200	2975
†Wilcox Trux	AA	1	130	S*-35x5	S*-35x5	Buda	CTU	4-3¾x5¼	Stro	Bosch	M	‡West	B-L	B-L	Rus	3600B	S B	Shu	Gem	Bim	1900	3600
†Wilcox Trux	BB	1½	144	S*-36x6	S*-38x7	Own		4-4¼x5	Stro	Bosch	M	‡West	B & B	Own	Wal	2A	D R	Shu	Own	Own	2550	4500
Yellow Cab	T1	1	130	P-33x5	P-33x5	Cont	V4	4-3¾x5	Zeni	Bosch	M	‡N-E	B-L	B-L	Tim	5773	S B	Tim	Gem	Bud	1240	3130

(2, 2½, 3, 3½, 4½, 4 TONS)

For specially designed Motor Bus chassis see pages 66 and 67

Those Truck Chassis which are sold and recommended for Passenger Transportation are designated in the following table by the ‡‡ reference sign in front of the name.

MAKE AND MODEL	GENERAL				ENGINE			ELECTRICAL SYSTEM			TRANSMISSION		REAR AXLE						
	Tons Capacity	Wheelbase (Ins.) (Standard)	Tires Type and Size (Ins.) Front	Tires Type and Size (Ins.) Rear	Make and Model	No. of Cylinders Bore and Stroke (Ins.)	Carburetor Make	Ignition System Make	Ignition System Current Source	Generator and Starter	Clutch Make	Gearset Make	Make and Model	Final Drive	Front Axle Make	Steering Gear Make	Wheels Make	Price	Chassis Weight (Lbs.)
‡‡Acme 40	2	141	S*-34x3½	S*-34x5	Cont J4	4-3¾x5	Zeni	Eise	M	‡Delco	B & B	Cot	Tim 6460	Wo	Tim	Ros	Bim		3980
‡‡Acme 40L	2	147	S*-34x3½	S*-34x6	Cont K4	4-4½x5¼	Zeni	Eise	M	‡Delco	B & B	Cot	Tim 6460	Wo	Tim	Ros	Bim		4500
Acme 60	3	152	S*-36x4	S*-36x7	Cont K4	4-4½x5¼	Zeni	Eise	M	‡Delco	B & B	Cot	Tim 6560	Wo	Tim	Ros	Bim		4830
‡‡Acme 60L	3	156	S*-36x4	S*-36x7	Cont L4	4-4½x5½	Zeni	Eise	M	‡Delco	B & B	Cot	Tim 6560	Wo	Tim	Ros	Bim		5050
Acme 90	4½	168	S*-36x5	S*-40x5d	Cont L4	4-4½x5½	Zeni	Eise	M	‡Delco	B & B	Cot	Tim 6666	Wo	Tim	Ros	Bim		6890
Acme 90L	4½	176⅛	S*-36x5	S*-40x5d	Cont B5	4-4¾x6	Ray	Eise	M	‡Delco§§	B & B	Cot	Tim 6666	Wo	Tim	Ros	Bim		8160
Amer. La France 2R	2½	160⅛	S-36x4	S-36x7	Own	4-4¼x6	Stro	Split	M	‡West	Own	Own	Own D R		Own	Ros	Opt		
Amer. La France 3R	3½	164⅛	S-36x5	S-36x5d	Own	4-4¼x6	Stro	Split	M	‡West	Own	Own	Own D R		Own	Ros	Opt		
†American 25	2½	158	S-36x4	S-36x4d	Wis TAU	4-4 x6	Stro	Apol	M	‡G-D§§	Del	Cot	Tho H	Wo	Sav	Ros	Ind	3350	5000
‡‡Armleder 41B	2½	182	S*-36x4	S*-36x8	Buda YTU	4-4½x6	Zeni	Bosch	M	‡West	B-L	B-L	Tim 6560	Wo	Tim	Ros	St M	3450	5200
‡‡Armleder HW	2½	148	S*-36x4	S*-36x7	Buda HTV	4-4¼x5½	Zeni	Bosch	M	‡West	B-L	B-L	Tim 6560	Wo	Tim	Ros	St M	3150	5000
‡‡Armleder WC	2½	148	S*-36x4	S*-36x8	Cont C4	4-4½x5¼	Zeni	Bosch	M	None	B-L	B-L	Tim 6560	Wo	Tim	Ros	St M	3150	5000
‡‡Armleder KWB	3½	156	S*-36x5	S*-36x5d	Buda YTU	4-4½x6	Zeni	Bosch	M	†West	B-L	B-L	Tim 6666	Wo	Tim	Ros	St M	4150	6900
‡‡Armleder KWC	3½	156	S*-36x5	S*-36x5d	Cont E4	4-4½x5½	Zeni	Bosch	M	None	B-L	B-L	Tim 6666	Wo	Tim	Ros	St M	4150	6900
Atterbury 22D	3½–4	174	S*-36x5	S*-40x6d	Cont L4	4-3¾x5	Zeni	Eise	M	§Delco	B-L	B-L	Tim 6666	Wo	Tim	Gem	Arc	4275	7500
Atterbury 22C	2½–3	156	S*-36x4	S*-36x4d	Cont K4	4-4¼x5¼	Zeni	Eise	M	§Delco	B-L	B-L	Tim 6560	Wo	Tim	Gem	Arc	3375	5670
‡‡Autocar 27H	2–3	114	S*-34x5	S*-36x8	Own 4-4	x5½	Stro	Bosch	M	‡L-N	Own	Own	Own D R		Own	Ros	Hoo	3100	5500
‡‡Autocar 27KA	2–3	162	S*-34x5	S*-36x4d	Own 4-4	x5½	Stro	Bosch	M	‡L-N	Own	Own	Own D R		Own	Ros	Hoo		5900
Available JH	2½	153	S*-36x4	S*-36x8	Herc 0	4-4 x5	Zeni	Bosch	M	‡Bosch	B-L	B-L	Tim 6560	Wo	Tim	Ros	St M	3160	5200
Available JH	3½	178	S*-36x5	S*-40x5d	Herc MU3	4-4½x5½	Stro	Bosch	M	‡Bosch	B-L	B-L	Tim 6666	Wo	Tim	Ros	St M	4175	6500
†Bessemer J2	2½	158	S-36x4	S-36x4d	Cont C2	4-4¼x5½	Stro	Eise	M	§§Eise	B & B	B-L	L-M 7250	T R	Shu	Ros	Sch	2895	4800
†Bessemer K2	4	175	S-36x5	S-36x10	Cont E7	4-4½x5½	Stro	Eise	M	§§Eise	B & B	B-L	Tor E	I G	Shu	Ros	Smi	3490	7250
‡‡Bethlehem GN	2	137⅛	S-34x4	S-34x6	Own 4-4	x5¼	Zeni	Bosch	M	G D	B & B	Det	Wis 60A	D R	She	Lav	Jon	2185	4100
‡‡Bethlehem HN	3	145	S-36x4	S-36x8	Own 4-4	x5¼	Zeni	Bosch	M	G D	Ful	Ful	Wis 88E	D R	She	Lav	Smi	2985	5250
Bridgeport B	2½	156	S*-36x4	S*-36x4d	Buda ETU	4-4¼x5½	Zeni	Eise	M	‡Bosch	B-L	B-L	Tim 6560	Wo	She	Ros	Jon	2990	5800
Bridgeport C	3½	175	S*-36x6	S*-36x12	Buda YTU	4-4½x6	Zeni	Eise	M	‡Bosch	B-L	B-L	Tim 6666	Wo	She	Ros	Jon	3990	9995
Brockway K	2½–3	153	S*-36x4	S*-36x8	Cont K4	4-4½x5¼	Stro	Split	M	‡L-N	B-L	B-L	Tim 6560	Wo	Tim	Gem	Hoo		5260
Buffalo 6	3	155	S-34x5	S-36x5d	Herc CU3	4-4 x5⅛	Stro	Bosch		Bosch	Cov	Cov	She D21	Wo	She	Ros	Jon		6200
Case TR	2	144	P-36x6	P-36x7	Own	4-4¼x5¾	Benn	Eise	M	§§Eise	T-D	Own	Tor C139	I G	Tor	Opt	St M		4700
‡‡Clinton 65	2½–3	184	S*-34x5	S*-34x5d	Buda ETU	4-4¼x5½	Zeni	Apol	M	§§Bosch	B-L	B-L	Tim 6560	Wo	Tim	Ros	St M		
Clinton 90	3½–4	190	S*-36x5	S*-36x6d	Buda YTU	4-4½x6	Zeni	Apol	M	§§Bosch	B-L	B-L	Tim 6666	Wo	Tim	Ros	St M	4260	7410
Clydesdale 6X	3¼	163	S-36x4	S-36x8	Cont K4	4-4¼x5¼	Zeni	Bosch	M	‡Bosch	B-L	B-L	Tim 6560	Wo	Tim	Ros			5850
Clydesdale 9	2	160	S-36x4	S-36x6	Cont J4	4-3¾x5	Zeni	Bosch	M	‡Bosch	B-L	B-L	Tim 6352	Wo	Spe	Ros			3950
Clydesdale 6	4¼	163	S-36x5	S-36x5d	Cont L4	4-4½x5½	Zeni	Bosch	M	‡Bosch	B-L	B-L	Tim 6560	Wo	Tim	Ros			5850
Clydesdale 8	3¼	156	S-36x4	S-36x7	Cont K4	4-4¼x5¼	Zeni	Bosch	M	‡Bosch	B-L	B-L	Tim 6460	Wo	Tim	Ros			5100
†Commerce 25	2½	156	S*-36x6	S*-40x8	Cont K4	4-4¼x5¼	Zeni	Eise	M	Bijur	B-L	B-L	Tim 6560	Wo	Tim	Ros			5200
Corbitt A	3½–4	178	S-36x5	S-36x10	Cont L4	4-4½x5½	Stro	Eise	M	‡Bosch	B-L	B-L	She W32	Wo	She	Ros	Smi	3790	7370
Corbitt R	2½–3	160	S*-36x4	S*-36x8	Cont L4	4-4½x5½	Stro	Eise	M	‡Bosch	B-L	B-L	She W21	Wo	She	Ros	Smi	3195	6160
Corbitt B	2½	152	S*-36x4	S*-36x8	Cont K4	4-4½x5¼	Stro	Eise	M	‡Bosch	B-L	B-L	She W21	Wo	She	Ros	Bim	2970	5100
Corbitt C	2	148	S*-36x4	S*-36x7	Cont K4	4-4¼x5¼	Stro	Eise	M	‡Bosch	B-L	B-L	She W103	Wo	She	Ros	Bim	2585	5265
‡‡Day-Elder BN	2	144	S*-34x3½	S*-34x5	Cont J4	4-3¾x5	Zeni	Eise	M	‡Bosch	B-L	B-L	Tim 6460	Wo	Col	Gem	Van		4100
Day-Elder DN	2½	144	S*-36x4	S*-36x7	Cont K4	4-4¼x5¼	Zeni	Eise	M	‡Bosch	B-L	B-L	Tim 6560	Wo	Col	Gem	Van		5100
Day-Elder CN	3	150	S*-36x4	S*-36x8	Buda HTU	4-4½x5½	Zeni	Eise	M	‡Bosch	B-L	B-L	Tim 6560	Wo	Col	Gem	Van		5900
Day-Elder FF	4	165	S*-36x5	S*-36x5d	Cont L4	4-4½x5½	Zeni	Eise	M	‡Bosch	B-L	B-L	Tim 6666	Wo	Col	Gem	Van		6700
Dearborn 48	2	148			Herc	4-4 x5	Stro	Bosch	M	‡Bosch	Ful	Ful	Wis 800J	Wo	Shu	Ros			
†Denby 33	2	136	P-35x5	P-38x7	Cont N	4-3¾x5	Stro	Eise	M	‡Remy	Ful	Ful	Cla 1D	I G	Cla	Ros	Mot	2375	3740
†Denby 35	3	155	S-36x4	S-36x7	Cont C2	4-4¼x5¼	Stro	Eise	M	§§Eise	Ful	Ful	Cla 2D	I G	Sta	Ros	Smi	2975	4500
†Denby 27	4	170	S-36x5	S-36x5d	Cont E7	4-4½x5½	Stro	Eise	M	None	Own	War	Cla 3D	I G	Sta	Ros	Smi	3695	7020
Diamond T U2	2½	144	S*-36x4	S*-36x8d	HinkHAA400	4-4 x5¼	Stro	Bosch	M		Cov	Cov	Tim 6560	Wo	Tim	Gem	Sch		5250
Diamond T K	3½	170	S*-36x5	S*-36x5d	Hink HA500	4-4¼x5½	Stro	Bosch	M		Cov	Cov	Tim 6666	Wo	Tim	Gem	Smi		7250
Dorris K4	2½	144	S*-36x4	S*-36x7	Own	4-4½x5½	Stro	Bosch	M	West	Own	War	Tim 6560	Wo	Tim	Ros	Smi	3400	
Dorris K7	3½	174	S-36x5	S-36x10	Own	4-4¼x5½	Stro	Bosch	M	West	Own	War	Tim 6666	Wo	Tim	Ros	Smi	4400	
†Duplex A	2	145	P-35x5	P-38x7	HinkHAA400	4-4 x5¼	Stro	West	B	West	Cov	Cov	She W103	Wo	She	Ros	Mot		3900
†Duplex AC	2½–3	160	S-34x5	S-36x8	Hink 400	4-4 x5¼	Stro	Eise	M	None	B-L	B-L	Vul 4	Wo	Vul	Ros	Mot		5200
†Duplex E	3½	130	S-36x8	S-36x8	Buda TU	4-4¼x5½	Sch	Eise	M	None	B-L	B-L	Own	I G	Own	Woh	Mot		6100
†Eagle 100	2	130	S*-34x4	S*-34x7	Buda CTU	4-3¾x5¼	Zeni	Eise	M	‡Bosch	Cov	Cov	Rus 600	I G	Col	Lav	Sta	2275	4100
F. W. D B	3	124	S-36x6	S-36x6	Wisc A	4-4¾x5½	Stro	Eise	M	‡N-E	H S	Cot	Own	S B	Own	Ros	Sch	4200	6460
Fageol	2½	150	S*-34x4	S*-36x7	Wauk CU	4-4⅜x5¾	Zeni	Split	M	†Opt	B-L	Own	Tim 6560	Wo	Tim	Ros		3900	4600
Fageol	3½–4	172	S-36x5	S-36x5d	Wauk DU	4-4½x6¼	Zeni	Split	M	†Opt	B-L	Own	Tim 6660	Wo	Tim	Ros		5000	7300
Fageol 30-60	3		P-36x6	P-36x6	Ha-S 50	4-4¼x5½	Zeni	Delco	B	Delco	B-L	Own	Tim 6666	Wo	Tim	Ros	Bud		
†Federal U-2	2½	156	S-36x4	S-36x7d	Cont K4	4-4¼x5¼	Zeni	Eise	M	Remy	B & B	Det	Tim 6560	Wo	Own	Gem			5400
†Federal W-2	3½–4	156	S-36x5	S-36x5d	Cont L4	4-4½x5½	Zeni	Eise	M	None	B & B	War	Tim 6660	Wo	Tim	Gem	Smi		7150
Garford 70H	2½	144	S*-36x4	S*-36x8	Buda HTU	4-3¾x5⅛	Stro	Split	M	‡A-K	Own	Own	Tim 6560	Wo	Tim	Ros			5300
Garford 80	4	162	S*-36x5	S*-36x5d	Buda YBU	4-4½x6	Stro	Split	M	‡A-K	Own	Own	Tim 6666	Wo	Tim	Ros	Smi		7850
G. M. C. K-41	2	146	S*-36x4	S*-36x7	Own 4-4	x5½	Marv	Remy	B	‡Remy	Own	Own	Tim Spec	Wo	Tim	Jac			5445
G. M. C. K-41T	2	127	S-36x4	S-36x8	Own 4-4	x5½	Marv	Remy	M	‡Rem§§	Own	Own	Tim	Wo	Tim	Jac			5250
G. M. C. K-71	3½	163	S*-36x5	S*-40x5d	Own	4-5½x6	Marv	Remy	M	‡Remy	Own	Own	Tim	Wo	Tim	Jac	Own		8070
G. M. C. K-71T	3½	138	S-36x5	S-36x12	Own	4-4½x6	Marv	Remy	B	‡Remy	Own	Own	Tim	Wo	Tim	Jac	Own		8120
Gary I	2	144	S-36x3½	S-36x5	Buda HTU	4-4¼x5½	Zeni	Eise	M	None	Ful	Ful	Tim 6460	Wo	Tim	Ros	Pru	2550	4500
Gary J	2½	Opt.	S-36x4	S-36x7	Buda HTU	4-4¼x5½	Zeni	Eise	M	None	Ful	Ful		Wo		Ros	Pru	3050	4910
Gary KT	3½	162	S-36x5	S-40x10	Buda YTU	4-4½x6	Zeni	Eise	M	None	B-L	B-L	Tim 6666	Wo	Tim	Ros	Pru	3950	8100
Gotfredson 50	2½	152	S*-36x4	S*-36x8	Buda EBU	4-4¼x5½	Zeni	Bosch	M	†A-K§§	B-L	B-L	Tim 6560	Wo	Tim	Gem	Day		6325
Gotfredson 80	4		S-34x5	S-36x12	Buda YBU	4-4½x6	Zeni	Bosch	M	§§A-K	B-L	B-L	Tim 6666	Wo	Tim	Gem	Day	4775	8400
Gramm Pioneer 125	2½	144	S*-36x4	S*-36x7	Cont K-4	4-4¼x5¼	Stro	N-E	B	§§N-E	Ful	Own	She W103	Wo	Col	Ros	Bim	2900	4910
Gramm Pioneer 30	3	150	S*-36x5	S*-36x10	Cont L-4	4-4½x5½	Stro	Eise	M	§§N-E	Ful	Own	She W21	Wo	She	Ros	Smi	3300	5300
Gramm Pioneer 40	4	156	S-36x5	S-36x10	Cont L-4	4-4½x5½	Stro	Eise	M	§§N-E	Ful	Own	She W32	Wo	She	Ros	Smi	3850	8040
Harvey WOA	2	160	S*-34x4	S*-34x7	Buda ETU	4-4¼x5½	Stro	Eise	M	None	Ful	Ful	She W103	Wo	She	Ros	Smi	2650	5400
Harvey WFB	2½	160	S-36x4	S-36x8	Buda ETU	4-4¼x5½	Stro	Eise	M	None	Ful	B-L	She W21	Wo	She	Ros	Smi	2950	6800
Harvey WHB	3½	160	S*-36x6	S*-36x6	Buda YTU	4-4½x6	Stro	Eise	M	None	Ful	B-L	She W32	Wo	She	Ros	Smi	3950	7600
†Hendrickson N	3		S-36x4	S-36x7	Buda ETU	4-4¼x5¼	Stro	Split	M	None	Ful	Ful	Tim 6560	Wo	Tim	Ros	Int	3200	5500
†Hendrickson M	4		S-36x5	S-36x10	Buda ETU	4-4¼x5¼	Stro	Split	M	None	Ful	Ful	Tim 6660	Wo	Tim	Ros	Int	3725	6940
‡‡Indiana 20	2	150	S*-36x4	S*-36x7	Own	4-4½x5½	Stro	Eise	M	‡Remy e	B & B	B-L	She W103	Wo	She	Woh	Bim		5400
‡‡Indiana 25	2½–3	156⅛	S*-36x4	S*-36x8	Own	4-4½x5½	Stro	Eise	M	‡Remy e	B & B	B-L	She W21	Wo	She	Woh	Bim		5850
‡‡Indiana 26	3	159	S*-36x4	S*-36x8	Own	4-4½x5½	Stro	Eise	M	‡Remy e	B & B	B-L	She W21	Wo	She	Woh	Bim		6050
‡‡Indiana 35	3½–4	160	S*-36x5	S*-36x10	Own	4-4⅝x5½	Stro	Eise	M	‡Remy e	B & B	B-L	She W32	Wo	She	Woh	Smi		7050
Indiana 40	4	160	S-36x5	S-40x12	Wauk DW	4-4½x6¼	Stro	Eise	M	‡West	B & B	B-L	She W32	Wo	She	Woh	Smi		
International 43	2	130	C*-36x4	S*-36x7	Own	4-3¾x5	Own	Bosch	M	‡Remy	Own	Own	Own I G		Own	Own	Own		
International 63	3	140	C*-36x5	S*-36x8	Own	4-4¼x5	Own	Bosch	M	‡Remy	Own	Own	Own I G		Own	Own	Own		

(2, 2½, 3, 3½, 4, 4½ TONS—Continued)

For specially designed Motor Bus chassis see pages 66 and 67

Those Truck Chassis which are sold and recommended for Passenger Transportation are designated in the following table by the ‡‡ reference sign in front of the name.

MAKE AND MODEL	GENERAL				ENGINE			ELECTRICAL SYSTEM			TRANSMISSION		REAR AXLE						
			Tires Type and Size (Ins.)					Ignition System											
	Tons Capacity	Wheelbase (Ins.) (Standard)	Front	Rear	Make and Model	No. of Cylinders Bore and Stroke (Ins.)	Carburetor Make	Make	Current Source	Generator and Starter Make	Clutch Make	Gearset Make	Make and Model	Final Drive	Front Axle Make	Steering Gear Make	Wheels Make	Price	Chassis Weight (Lbs.)
†Kalamazoo LG	2	144	S-36x4	S-36x7	Here 0	4-4 x5			M		Ful	Ful	She W103	Wo	She	Ros		2775	5000
†Kalamazoo NH	3	160	S-36x5	S-36x10	Wisc TAU	4-4 x6	Stro	Bosch	M	‡Dyn	Ful	Ful	She W21	Wo	She	Ros	Smi	2350	6200
†Kalamazoo HD	3	160	S-36x5	S-36x10	Wisc UAU	4-4¼x6	Stro	Bosch	M	‡Dyn	Ful	Ful	She W21	Wo	She	Ros	Smi	3500	5400
†Kalamazoo SK	4	160	S-36x5	S-36x12	Wisc UAU	4-4¼x6	Stro	Bosch	M	‡Dyn	Ful	Ful	She W30	Wo	She	Ros	Smi	4000	7800
†Keystone 40	2	144	P-34x5	P-38x7	Buda WU	4-3¾x5½	Zeni	Berl	M	Bosch	Ful	Ful	Rus 6000	I G	Tor	Ros	Hoo	2175	4000
Kissel	4	168	S*-36x5	S*-36x5d	Own	4-4¼x5½	Stro	Eise	M	‡Remy	War	War	She W31	Wo	She	Ros	Smi		7200
Kissel	2½	168	S*-36x4	S*-36x7	Own	4-4¼x5½	Stro	Eise	M	‡Remy	War	War	Tim 6560	Wo	Tim	Ros	Bim		5100
Krebs B120	3½	180	S-36x6	S-40x6d	Cont B5	4-4¾x6	Zeni	Bosch	M	‡Bosch	B-L	B-L	Tim 6666	Wo	Tim	Ros	Smi		7910
Krebs L75	2½	180	S*-36x4	S-36x4d	Cont L4	4-4½x5½	Zeni	Bosch	M	‡Bosch	B-L	B-L	Tim 6560	Wo	Tim	Ros	Smi		7210
Krebs L110	3½	190	S*-36x5	S-40x5d	Cont L4	4-4½x5½	Zeni	Bosch	M	‡Bosch	B-L	B-L	Tim 6666	Wo	Tim	Ros	Smi		6860
‡‡Larrabee XJ	2¼	168	P-36x6	P-36x6	Cont 8R	6-3⅜x4½	Zeni	Bosch	B	Bosch	B-L	B-L	She W1501	Wo	She	Gem	Smi	2465	4200
Larrabee K5	2–3½	176	S*-36x4	S*-36x8	Cont L4	4-4½x5½	Zeni	Bosch	M	‡Bosch	B-L	B-L	She W22	Wo	She	Ros	Smi	3550	5750
Larrabee L4	3–4½	186	S*-36x5	S*-36x12	Cont L4	4-4½x5½	Zeni	Bosch	M	‡Bosch	B-L	B-L	She W32	Wo	She	Ros	Smi	4100	7600
‡‡Maccar H1	3	162	S*-36x4	S*-36x5d	Wisc UAU	4-4½x6	Stro	Eise	M	‡Bosch	B-L	B-L	Tim 6560	Wo	Tim	Ros	Day		6300
Maccar M2	4	174	S*-36x5	S-36x6d	Wisc VAU	4-4½x6	Stro	Eise	M	‡Bosch	B-L	B-L	Tim 6666	Wo	Tim	Ros	Day		7300
‡‡Mack AB	2	146½	S*-36x4	S*-36x4d	Own	4-4¼x5	Zeni	Split	M	‡L-N	Own	Own	Own D	R	Own	Cwn	Day	3750	5400
‡‡Mack AB	2	146½	S*-36x4	S*-36x4d	Own	4-4¼x5	Zeni	Split	M	‡L-N	Own	Own	Own Cn		Own	Own	Day	3300	5250
‡‡Mack AB	2½	146½	S*-36x4	S*-36x4d	Own	4-4¼x5	Zeni	Split	M	‡L-N	Own	Own	Own Ch		Own	Own	Day	3400	5350
‡‡Mack AB	2½	146½	S*-36x4	S*-36x4d	Own	4-4¼x5	Zeni	Split	M	‡L-N	Own	Own	Own D	R	Own	Own	Day	3400	5350
‡‡Mack AB	2½	146½	S*-36x4	S*-36x4d	Own	4-4¼x5	Zeni	Split	M	‡L-N	Own	Own	Own Cb		Own	Own	Sta	4950	9150
‡‡Mack AC	3½	156	S*-36x5	S*-40x5d	Own	4-5 x6	Zeni	Split	M	‡L-N	Own	Own	Own		Own	Own	W	3600	4750
†*Maple leaf* AA	2	144	S-36x4	S-36x7	Hink HA400	4-4 x5¼	Stro	Eise	M	‡West	Ful	Ful	She W103	Wo	She	Ros	Smi	4250	5650
†*Maple leaf* BB	3	150	S-36x4	S-36x8	Hink HA500	4-4¼x5½	Stro	Eise	M	None	Ful	Ful	She W21	Wo	She	Ros	Smi	4800	7100
†*Maple leaf* CC	4	160	S-36x5	S-36x10	Hink HA200	4-4½x5½	Stro	Eise	M	None	Ful	Ful	She W31	Wo	She	Ros	Smi		5700
Master 41	2½	154	S-34x4	S-36x8	Buda ETU	4-4¼x5½	Zeni	Eise	M	None	Ful	Ful	Tim 6560	Wo	Tim	Ros	Pru		5700
Master 51	3½	158	S-36x5	S-40x10	Buda YTU	4-4½x6	Zeni	Eise	M	None	Ful	Ful	Tim 6666	Wo	Tim	Ros	Smi		8100
Menominee D	2½	144	S*-36x4	S*-36x8	Wisc TAU	4-4 x6	Stro	Eise	M	‡Bosch	Det	Cot	Wis 800J	Wo	Con	Ros	Bim	2875	4870
Menominee G	3½	160	S*-36x5	S*-36x10	Wisc VAU	4-4½x6	Stro	Eise	M	‡Bosch	Det	Cot	Tim 6666	Wo	Con	Ros	Smi	3800	6750
National HE	2½	152	S*-36x5	S*-36x10	Wauk CU	4-4¾x5¾	Zeni	Eise	M	‡N-E§§	H-S	B-L	Tim 6560	Wo	Tim	Ros	Smi		5100
National NB	3½	164	S*-36x6	S*-36x6d	Wauk DU	4-4½x6¼	Zeni	Eise	M	‡N-E§§	H-S	B-L	Tim 6666	Wo	Tim	Ros	Smi		7650
Noble B31	2	156	S*-36x4	S*-36x7	Buda CTU	4-3¾x5¼	Stro	Eise	M	‡Bosch		Ful	She W103	Wo	She	Lav	Bim	2690	4710
Noble D51	2½–3	162	S*-36x4	S*-36x8	Buda ETU	4-4¼x5½	Stro	Eise	M	‡Bosch	Ful	Ful	She W21	Wo	She	Lav	Bim	3150	5700
Noble E71	3½–5	164	S*-36x5	S*-36x10	Buda YTU	4-4½x6	Stro	Eise	M	‡Bosch	Ful	War	She W30	Wo	She	Lav	Bim	3850	7200
Old Reliable B	2½	140	S-36x4	S-36x8d	Wisc UAU	4-4¼x6	Stro	Apol	M	‡Bosc§§	Ful	Ful	She W21	Wo	She	Ros	St M	3500	6300
Old Reliable C	3½	140	S-36x5	S*-36x12	Wauk DU	4-4½x6¼	Stro	Apol	M	‡Bosc§§	Ful	Ful	She W32	Wo	She	Ros	St M	4500	8400
‡‡Patriot 9L	2	146	S*-34x4	S*-34x7	Hink 400	4-4 x5¼	Stro	Eise	M	‡Bijur	Cov	Ful	Tim 6560	Wo	Shu	Ros	Bim	2400	4400
Patriot 8W	3	156	S*-36x5	S*-36x8	Hink 200	4-4½x5½	Stro	Eise	M	‡Bijur	Cov	Cov	Wis 900B	Wo	Shu	Ros	Bim	3000	5400
Pierce-Arrow XA	2	162	S*-36x4	S*-36x5d	Own	4-4 x5½	Stro	Delco	B	Delco	Cov	Cov	Eat	Wo	Eat	Ros	Bet		6280
Pierce-Arrow XB	3	180	S*-36x4	S*-36x5d	Own	4-4 x5½	Stro	Delco	B	Delco	Cov	Cov	Eat	Wo	Eat	Ros	Bet		6280
Pierce-Arrow WC	4		S*-36x5	S*-36x6d	Own	4-4½x6¾	Stro	Delco	B	Delco	Cov	Own	Own	Wo	Own	Own	Bet		8490
Rainier R28	2–2½	157	S*-34x4	S*-34x7	Cont K4	4-4⅛x5¼	Zeni	Eise	M	‡Delco	B-L	B-L	She W103	Wo	She	Ros	Jon		4900
‡‡Rainier R20	2½–3	165	S*-36x4	S*-36x8	Cont K4	4-4⅛x5¼	Zeni	Eise	M	‡Delco	B-L	B-L	Tim 6560	Wo	Tim	Ros	Jon		6000
Rainier R25	3½–5	170	S-36x5	S-36x5d	Cont L4	4-4½x5½	Zeni	Eise	M	‡Delco	B-L	B-L	Tim 6666	Wo	Tim	Ros	Jon		8000
Red Ball A	3	174	S-35x6	S-36x6	Wauk CU	4-3¾x5¾	Sche	Bosch	M	Bosch	M & E	Cov	Wis 900CA	Wo	Con	Ros	Van	2200	7700
Republic 20	4½	165	S*-36x5	C*-36x10	Cont L4	4-4½x5½	Stro	Bosch	M	‡Bosch	Ful	Ful	Tor	I G	Sav	Jac	Smi		6700
Republic 11X	2	144	C*-34x3½	C*-34x5	Cont J4	4-3¾x5	Stro	Bosch	M	‡Bosch	Ful	Ful	Tor	I G	Tor	Jac	Nor		3900
Republic 19	3	154	C*-36x4	C*-36x8	Cont K4	4-4⅛x5¼	Stro	Bosch	M	‡Bosch	Ful	Ful	Tor	I G	Tor	Jac	Nor		4500
†Rowe CDW	2	140	C-34x5	S-36x3½d	Wisc EAU	4-4 x5	Zeni	Bosch	M	‡Opt	B-L	B-L	She W103	Wo	She	Ros	Hoo	3300	4500
†Rowe CDW	2½	142	C-34x5	S-36x4d	Wisc NU	4-4¼x5	Zeni	Bosch	M	‡Opt	B-L	B-L	She W21	Wo	She	Ros	Hoo		4800
†Rowe GSW	3	158	C-34x6	S-36x5d	Wisc TAU	4-4 x6	Zeni	Bosch	M	‡Opt	B-L	B-L	She W21	Wo	She	Ros	Hoo	4150	5900
†Rowe HW	4	158	C-36x7	S-36x6d	Wisc UAU	4-4¾x6	Zeni	Bosch	M	‡Opt	B-L	B-L	She W31	Wo	She	Ros	Hoo	4500	6370
‡‡Ruggles 40	2½	148	P-34x5	S*-34x7	Here 0	4-4 x5	Zeni	Bosch	M	‡Remy	B-L	B-L	Wis 65	D R	Col	Jac	Nor		4250
‡‡Ruggles 40H	3	148	S*-36x4	S*-36x8	Here 0	4-4 x5	Zeni	Bosch	M	‡Remy	B-L	B-L	Wis 88E	D R	Col	Jac	Nor		4850
†Sanford 25	2½	174	S-36x4	S-36x4d	Cont C4	4-4⅛x5¼	Stro	Eise	M	None	B & B	B-L	She W21	Wo	She	Ros	Hoo		5110
†Sanford W35	3½–5	174	S-36x5	S-36x5d	Cont E4	4-4½x5½	Stro	Eise	M	None	B & B	B-L	She W31	Wo	She	Ros	Hoo		6408
‡‡Schacht G	2	156	S*-36x4	S*-36x7	Wisc UAU	4-4¼x6	Zeni	Bosch	M	None	B & B	Own	Own	Wo	Own	Own	St M	3200	6200
‡‡Schacht G	2½	156	S*-36x4	S*-36x8	Wisc UAU	4-4¼x6	Zeni	Bosch	M	None	B & B	Own	Own	Wo	Own	Own	St M	3400	6400
‡‡Schacht G	3	156	S*-36x5	S*-36x10	Wisc UAU	4-4¼x6	Zeni	Bosch	M		B & B	Own	Own	Wo	Own	Own	St M	3800	6700
Schacht G	4	168	S-36x5	S-40x12	Wisc VAU	4-4½x6	Zeni	Bosch	M	None	B & B	Own	Own	Wo	Own	Own	St M	4400	7800
Selden 30C	1½	137½	S*-34x3½	S*-34x5	Cont J4	4-3¾x5	Stro	Eise	M	‡N-E	B-L	B-L	Tim 6460	Wo	Tim	Gem	Arc		4250
Selden 33	2½ 1½– 2½	146	S*-34x4	S*-34x6	Cont K4	4-4⅛x5¼	Stro	Eise	M	‡N-E	B-L	B-L	Tim	Wo	Tim	Ros	Van		
Selden 50	2½– 3½	149	S*-36x4	S*-36x7	Cont K4	4-4⅛x5¼	Stro	Bosch	M	‡N-E	B-L	B-L	Tim	Wo	Tim	Gem	St M		5980
Selden 53	2½– 3½	154	S*-36x4	S*-36x8	Cont L4	4-4½x5½	Stro	Bosch	M	‡N-E	B-L	B-L	Tim	Wo	Tim	Gem	Int		6220
Selden 70	3½–5	164	S*-36x5	S*-36x10	Cont L4	4-4½x5½	Stro	Bosch	M	‡N-E	B-L	B-L	Tim	Wo	Tim	Gem	Int		7530
Selden 73	3½–5	168	S*-36x5	S-36x10	Cont B5	4-4¾x6	Stro	Bosch	M	‡N-E	B-L	B-L	Tim	Wo	Tim	Gem	Int		7721
‡‡Service 42	2	154	S*-36x4	S*-36x7	Buda EBU	4-4¼x5½	Stro	Eise	M	‡Remy	B & B	B-L	Tim 6460	Wo	Tim	Ros	Sta		5435
‡‡Service 61	3	164½	S*-36x4	S*-36x8	Buda EBU	4-4¼x5½	Stro	Eise	M	‡Remy	B & B	B-L	Tim 6560	Wo	Tim	Ros	Sta		5785
Service 81	4	173½	S*-36x5	S*-36x10	Buda YBU	4-4½x6	Stro	Eise	M	‡Remy	B & B	B-L	Tim 6666	Wo	Tim	Ros	Sta		7900
†Signal H	2½	146	S-34x4	S-36x6	Cont K4	4-4⅛x5¼	Stro	Eise	M	‡Delco	B-L	B-L	Tim 6460	Wo	Tim	Ros	St M		4750
†Signal J	3½	150	S-34x4	S-36x8	Cont K4	4-4⅛x5¼	Stro	Eise	M	‡Delco	B-L	B-L	Tim 6560	Wo	Tim	Ros	St M		5250
‡‡Standard K	3½	147	S*-36x4	S*-36x8	Cont K4	4-4⅛x5¼	Stro	Eise	M	‡Bosch	B-L	B-L	Tim 6560	Wo	Tim	Gem	Day		5400
Sterling	2½	156	S*-36x4	S*-36x4	Wauk CU	4-4¾x5¾	Zeni	Eise	M	‡Bosch	B-L	B-L	Tim 6560	Wo	Tim	Ros	Hoo	3525	8350
Sterling	3½	162	S*-36x5	S*-40x5d	Wauk DU	4-4½x6¼	Zeni	Eise	M	‡Bosch	H-S	Own	Tim 6666	Wo	Tim	Ros	Hoo	4560	8350
Stewart 7X	2½	156	S*-34x5	S*-34x8	Buda HTU	4-4¼x5½	Zeni	Eise	M	Remy		Ful	Cla 2-D	I G	Col	Ros	Cla	2590	4870
Stewart 10X	3½	165	S*-36x5	S*-36x12	Buda YTU	4-4½x6	Zeni	Eise	M	§§Eise		Ful	Cla 3-D	I G	Col	Ros	Cla	3440	6720
†Stoughton D	2	140	S-36x4	S-36x7	Here CU3	4-4 x5⅛	Stro	Eise	M	‡West§§	B-L	B-L	She W103	Wo	She	Ros	Roy	2499	4600
†Stoughton F	3	156	S-36x5	S-36x5d	Mid 402	4-4¼x5¼	Zeni	Eise	M	‡Rem§§	B-L	B-L	She W21	Wo	She	Ros	Roy	3150	5900
†Superior E	2	144	S*-36x4	S*-36x6	Cont C2	4-4½x5¼	Stro	Eise	M	‡West	Ful	Ful	Tor	I G	Tor	Ros	Schw	2450	3800
†Tiffin MW	2½–3	148	S-36x4	S-36x3½d	Cont C4	4-4⅛x5¼	Sche	Bosch	M	‡Eise c	Ful	Ful	She W21	Wo	She	Ros	Smi	2700	5125
†Tiffin F35	3½–4	160	S-36x5	S-40x5d	Cont L4	4-4½x5½	Stro	Bosch	M	‡West	Del	Cot	She W31	Wo	She	Ros	Smi	3600	7150
†Titan	2½	156	S-36x4	S-36x8	Buda HTU	4-4¼x5½	Zeni	Eise	M	‡West	B & B	Cot	Own D	R	Wis	Lav	Smi	2700	5570
†Titan	3½	156	S-36x5	S-40x10	Buda YTU	4-4¼x5½	Zeni	Eise	M	‡West	B & B	Cot	Own D	R	Shu	Lav	Smi	3600	
Traffic	2	142	S*-34x3½	S*-34x6	Cont N	4-3¾x5	Cart	Bosch	M	‡Bosch	Cov	Cov	Rus 34	I G	Own	Own	Bim	1695	3450

(2, 2½, 3, 3½, 4, 4½ TONS—Continued)

For specially designed Motor Bus chassis see pages 66 and 67

Those Truck Chassis which are sold and recommended for Passenger Transportation are designated in the following table by the ‡‡ reference sign in front of the name.

MAKE AND MODEL	GENERAL				ENGINE			ELECTRICAL SYSTEM			TRANSMISSION		REAR AXLE						
	Tons Capacity	Wheelbase (Ins.) (Standard)	Tires Type and Size (Ins.) Front	Tires Type and Size (Ins.) Rear	Make and Model	No. of Cylinders Bore and Stroke (Ins.)	Carburetor Make	Ignition System Make	Ignition System Current Sources	Generator and Starter Make	Clutch Make	Gearset Make	Make and Model	Final Drive	Front Axle Make	Steering Gear Make	Wheels Make	Price	Chassis Weight (Lbs.)
Traffic	3	135	S*-36x4	S*-36x8	Cont.....N	4-3¾x5	Cart....	Bosch...	M..	‡Bosch..	Cov...	Cov...	Rus.....6000	I G.	Tor...	Own..	Bim...	2145	3985
Transport.....36	2	144	S*-36x3½	S*-36x6	Buda...GTU	4-4 x5¼	Zeni....	Eise....	M..	§Remy..	Ful...	Ful...	Cla.....1D	I G.	Col...	Jac...	Mot...	.....	3300
Transport.....61	3½	150	S*-36x4	S*-36x8	Buda...ETU	4-4¼x5½	Zeni....	Eise....	M..	§Remy..	Ful...	Ful...	Cla.....2D	I G.	Col...	Jac...	Mot...	.....	5600
Traylor.....C	2	146	S-36x4	S-36x7d	Buda...ITU	4-4x5½	Zeni....	Split....	M..	§§West.	Cov...	Cov...	She.....	Wo.	She...	Ros...	Sch...	2850	5500
Traylor.....D	3	150	S-36x4	S-36x8d	Buda...HTU	4-4¼x5½	Zeni....	Split....	M..	§§West.	Own..	Own..	She.....	Wo.	She...	Ros...	Sch...	3300	6200
†Triangle.....C	2–2½	147	S*-36x4	S*-36x7	Wauk..BUX	4-3¾x5¼	Stro....	Eise....	M..	‡Eise b..	Ful...	Ful...	Cla.....2D	I G.	Tor...	Gem..	Nor...	2285	4250
Triangle.....B	2½–3	150	S*-36x4	S*-36x8	Wauk....FU	4-4 x5¾	Stro....	Eise....	M..	‡Spht§§.	Ful...	Ful...	Cla.....2D	I G.	Tor...	Gem..	Nor...	3300	4900
‡‡Ultimate.....AJL	2	156	S*-36x3½	S-36x3d	Buda...EBU	4-4¼x5½	Stro....	Eise....	M..	‡Bosch..	B-L...	B-L...	She....W103	Wo.	She...	Ros...	Jon...	3300	4590
‡‡Ultimate.....BXL	3	200	S*-36x3½	S*-36x8d	Buda...EBU	4-4¼x5½	Stro....	Eise....	M..	‡Bosch..	B-L...	B-L...	She....W21	Wo.	She...	Ros...	Jon...	3850	.....
‡‡United.....50	2½	156	S*-34x4	S*-34x8	Herc.....0	4-4 x5	Zeni....	Bosch...	M..	‡Bosch..	B-L...	B-L...	Wis.....60	D R	Shu...	Lav...	.....	.....	4200
‡‡United.....80	3½–5	157	S-36x5	S-36x10	Herc...MU3	4-4½x5½	Zeni....	Bosch...	M..	‡Bosch..	B-L...	B-L...	Wis.....120	D R	Con...	Lav...	Van...	.....	6800
‡‡United.....35	2	148½	P-34x5	S*-34x7	Herc.....0	4-4x5	Zeni....	Bosch...	M..	‡Bosch..	B-L...	B-L...	Wis.....50	D R	Shu...	Lav...	.....	.....	3810
U. S.....NW	2	144½	S*-36x4	S*-36x6	Buda...WTU	4-3½x5½	Stro....	Bosch...	B..	‡Bosch..	Ful...	Ful...	She....W103	Wo.	Shu...	Lav...	Sch...	2525	4350
U. S.....R	3	156	S*-36x4	S*-36x8	HinkHAA400	4-4 x5¼	Stro....	Eise....	M..	‡Bosch..	B-L...	B-L...	She....W22	Wo.	Shu...	Lav...	Sch...	3375	5300
U. S.....S	4	168	S*-36x5	S*-36x5d	Hink..HA200	4-4½x5½	Stro....	Eise....	M..	‡Bosch..	B-L...	B-L...	She....W31	Wo.	She...	Lav...	Sch...	4075	6930
Veteran.....D	2½	156	S-36x4	S-36x7	Buda...HTU	4-4¼x5½	Zeni....	Eise....	M..	None...	B & B.	Cot...	She.....W21	Wo.	She...	Ros...	Smi...	.....	.....
Veteran.....H	3½–4	156	S-36x4	S-36x7	Buda...YTU	4-4½x6	Zeni....	Eise....	M..	None...	B & B.	Cot...	She.....W31	Wo.	She...	Ros...	Smi...	2400	.....
‡‡Victor.....40	2½	135	S*-34x3½	S*-34x5	Herc.....0	4-4 x5	Zeni....	Eise....	M..	None...	Ful...	Ful...	Wis.....50	D R	Shu...	Lav...	.....	1650	3935
‡‡Victor.....50	3½	142	S-34x4	S-34x7	Herc.....0	4-4 x5	Zeni....	Eise....	M..	None...	Ful...	Ful...	Wis.....65	D R	Shu...	Lav...	Van...	2100	4395
‡‡Victor.....60-70	4½	156	S-36x4	S-36x8d	Herc.....0	4-4 x5	Zeni....	Eise....	M..	None...	Ful...	Ful...	Wis.....88E	D R	Shu...	Lav...	.....	2400	5310
†Walter.....M	2½	144	S*-36x4	S*-36x8	Wauk....FU	4-4 x5¾	Stro....	Apol....	M..	West....	B-L...	B-L...	Own.....	D R	Con...	Gem..	Jon...	3600	5500
†White.....20	2	168	S-36x4	S-36x7d	Own.....	4-4¾x5½	Zeni....	.....	M..	‡N-E....	Own..	Own..	Own.....	D R	Own..	Own...	.....	3250	4815
†White.....40	3½	174	S-36x5	S-40x5d	Own.....	4-4¼x5¾	Zeni....	.....	M..	‡L-M....	Own..	Own..	Own.....	D R	Own..	Own...	.....	4200	7300
†Wilcox.....CC	2½	150	S*-36x6	S*-40x8	Own.....	4-4¼x5	Stro....	Bosch...	M..	‡West...	B & B.	Own..	Wal.....25A	D R	Shu...	Own..	Cla...	3000	4900
†Wilcox.....EE	3½	162	S-36x5	S-36x10	Buda...YTU	4-4½x6	Stro....	Bosch...	M..	West....	M & E	Own..	Wal.....5A	D R	She...	Own..	Cla...	3950	7500

(5 TONS AND OVER)

For specially designed Motor Bus chassis see pages 66 and 67

Those Truck Chassis which are sold and recommended for Passenger Transportation are designated in the following table by the ‡‡ reference sign in front of the name.

MAKE AND MODEL	GENERAL				ENGINE			ELECTRICAL SYSTEM			TRANSMISSION		REAR AXLE						
	Tons Capacity	Wheelbase (Ins.) (Standard)	Tires, Type and Size (Ins.) Front	Tires, Type and Size (Ins.) Rear	Make and Model	No. of Cylinders Bore and Stroke (Ins.)	Carburetor Make	Ignition System Make	Ignition System Current Sources	Generator and Starter	Clutch Make	Gearset Make	Make and Model	Final Drive	Front Axle Make	Steering Gear Make	Wheels Make	Price	Chassis Weight (Lbs.)
Acme.....125	6¼	180	S-36x6	S-40x6d	Cont.....B5	4-4¾x6	Ray....	Eise....	M..	‡Delco§§	B & B.	Cot...	Tim....6760	Wo.	Tim..	Ros...	Bim...	.....	8970
Amer. La France.....5R	5	....	S-36x6	S-40x6d	Own.....	4-4¾x6	Stro....	Splt....	M..	‡West..	Own..	Own..	Own.....	Wo.	Own..	Ros...	Day...	.....	.....
Atterbury.....AE	5–6	168	S-36x6	S-40x7d	Cont.....B2	4-4¾x6	Zeni....	Eise....	M..	§§Delco.	B-L...	B-L...	Tim....6760	Wo.	Tim...	Gem..	Sta...	4975	9496
‡‡Autocar.....M	4–6	120	S-34x6	S-36x12	Own.....	4-4¼x5½	Stro....	Bosch...	M..	‡L-N....	Own..	Own..	Own.....	D R	Own..	Ros...	Hoo...	4200	7200
‡‡Autocar.....L	4–6	156	S-34x6	S-36x12	Own.....	4-4¼x5½	Stro....	Bosch...	M..	‡L-N....	Own..	Own..	Own.....	D R	Own..	Ros...	Hoo...	4350	7400
Available.....JH5	5	190	S-36x6	S-40x12	Herc.....T3	4-5 x6	Stro....	Bosch...	M..	‡Bosc§§.	B-L...	B-L...	Tim....6760	Wo.	Tim...	Ros...	Smi...	.....	9500
Brockway.....T	5–6	174	S-36x5	S-40x14	Cont.....B5	4-4¾x6	Stro....	Split....	M..	‡L-N....	B-L...	B-L...	Tim....6760	Wo.	Tim...	Gem..	Smi...	.....	9075
Brockway.....R	3½–5	164	S*-36x5	S-36x5d	Cont.....L4	4-4½x5½	Stro....	Split....	M..	‡L-N....	B-L...	B-L...	Tim....6660	Wo.	Tim...	Gem..	Smi...	.....	7075
Clinton.....120	5–7	204	S-36x6	S-36x7d	Buda...BTU	4-5 x6½	Zeni....	Apol....	M..	§§Bosch.	B-L...	B-L...	Tim....6760	Wo.	Tim...	Ros...	St M..	4990	9400
Clydesdale.....4	6½	177	S-36x6	S-36x6d	Cont.....B5	4-4¾x6	Zeni....	Bosch...	M..	‡Bosch..	B-L...	B-L...	Tim....6666	Wo.	Tim...	Ros...	.....	.....	7500
Clydesdale.....4X	6½	177	S-36x5	S-40x5d	Cont.....L4	4-4½x5½	Zeni....	Bosch...	M..	‡Bosch..	B-L...	B-L...	Tim....6666	Wo.	Tim...	Ros...	.....	.....	5850
Clydesdale.....2	9½	176	S-36x7	S-40x7d	Cont.....B5	4-4¾x6	Zeni....	Bosch...	M..	‡Bosch..	B-L...	B-L...	Tim....6760	Wo.	Tim...	Ros...	.....	.....	9000
Corbitt.....AA	5	178	S-36x6	S-40x12	Cont.....B5	4-4¾x6	Stro....	Eise....	M..	‡Bosch..	B-L...	B-L...	She....W51	Wo.	She...	Ros...	Smi...	4250	9410
Day-Elder.....EN	5–6	162	S-36x5	S*-40x6d	Cont.....B5	4-4¾x6	Zeni....	Eise....	M..	‡West c.	B-L...	B-L...	Tim....6760	Wo.	Tim...	Gem..	Van...	.....	8800
†Denby.....210	5	170	S-36x6	S-40x6d	Cont.....E7	4-4½x5½	Stro....	Eise....	M..	None...	Own..	War..	Cla.....5D	I G.	Sta...	Ros...	Cla...	4295	8590
Diamond T.....EL	5	180	S-36x6	S-40x6d	Hink..HA200	4-4½x5½	Stro....	Bosch...	M..	None...	Cov...	Cov...	Tim....6760	Wo.	Tim...	Gem..	Smi...	.....	8625
Diamond T.....S	5	170	S-36x6	S-40x6d	Hink.....B2	4-4¾x6	Stro....	Bosch...	M..	‡Opt....	B-L...	B-L...	Tim....6760	Wo.	Tim...	.....	Smi...	.....	8750
Fageol.....F	5–6	172	S-36x6	S-40x6d	Wauk....DU	4-4½x6¼	Zeni....	Split....	M..	‡Opt....	B-L...	Own..	Tim....6760	Wo.	Tim...	Ros...	Own..	5700	8300
Federal.....X-2	5–6	163	S-36x6	S-40x6	Cont.....B5	4-4¾x6	Zeni....	Eise....	M..	§§Remy.	B & B.	War..	Tim....6760	Wo.	Tim...	Gem..	Smi...	.....	8700
Garford.....151A	5	167	S-36x6	S-40x6d	Buda...BTU	4-5 x6½	Stro....	Splt....	M..	‡West..	Own..	Own..	Own.....	Ch..	Tim...	Ros...	Cla...	.....	10100
Garford.....68D	5	162	S-36x6	S-40x6d	Buda...BTU	4-5 x6½	Stro....	Split....	M..	‡West..	Own..	Own..	Tim....6760	Wo.	Tim...	Ros...	Smi...	.....	9350
†Gary.....M	5	182	S-36x6	S-40x12	Buda...BTU	4-5 x6½	Zeni....	Eise....	M..	‡Opt....	B-L...	B-L...	Tim....6760	Wo.	Tim...	Ros...	P & B.	5750	.....
G. M. C.....K101	5	163	S-36x5	S-40x5d	Own.....	4-4½x6	Marv...	Remy...	M..	‡Remy..	Own..	Own..	Tim.....	Wo.	Tim...	Jac...	Own..	.....	8670
G. M. C.....K101T	5	138	S-36x5	S-36x7d	Own.....	4-4½x6	Marv...	Remy...	M..	‡Remy..	Own..	Own..	Tim.....	Wo.	Tim...	Jac...	Own..	.....	8880
Gotfredson.....100	5	166‡	S-36x6	S-40x14	Buda...BTU	4-5 x6½	Zeni....	Bosch...	M..	§§A-K..	B-L...	B-L...	Tim....6760	Wo.	Tim...	Gem..	Day...	.....	9700
Gramm Pioneer.....50	5–6	168	S-36x6	S-40x12	Cont.....B2	4-4¾x6	Stro....	Eise....	M..	§§M-E‡.	Own..	Own..	She.....W51	Wo.	Sta...	Ros...	Smi...	4450	4850

(5 TONS AND OVER—Continued)

For specially designed Motor Bus chassis see pages 66 and 67

Those Truck Chassis which are sold and recommended for Passenger Transportation are designated in the following table by the ‡‡ reference sign in front of the name.

MAKE AND MODEL	GENERAL				ENGINE			ELECTRICAL SYSTEM			TRANSMISSION		REAR AXLE						
	Tons Capacity	Wheelbase (Ins.) (Standard)	Tires Type and Size (Ins.) Front	Tires Type and Size (Ins.) Rear	Make and Model	No. of Cylinders Bore and Stroke (Ins.)	Carburetor Make	Ignition System Make	Ignition System Current Source	Generator and Starter	Clutch Make	Gearset Make	Make and Model	Final Drive	Front Axle Make	Steering Gear Make	Wheels Make	Price	Chassis Weight (Lbs.)
Harvey WFT	6††	125	S-36x4	S-36x8	Buda ETU	4-4¼x5½	Stro	Eise	M	None	Ful	B-L	She W21	Wo	She	Ros	Smi	3050	6800
Harvey WHT	10††	125	S-36x6	S-36x6	Buda YTU	4-4½x6	Stro	Eise	M	None	Ful	B-L	She W32	Wo	She	Ros	Smi	4050	7600
†Hendrickson K	6	....	S*-36x6	S-40x12	Wauk EU	4-5x6	Stro	Split	M	None	Ful	Ful	Tim 6760	Wo	Tim	Ros	Int	4725	8500
‡‡Indiana 51	5–7	170	S*-36x6	S-40x12	Wauk EU4	4-5 x6¼	Stro	Eise	M	‡West	B & B	B-L	She 51W	Wo	She	Won	Smi	....	9000
International 103	5	160	C-36x5	S-40x14	Own	4-4¼x5	Own	Bosch	M	‡Remy	Own	Own	Own I G		Own	Own	Own	....	....
†Kalamazoo OK	5	160	S-36x6	S-40x14	Wis VAU	4-4½x6	Stro	Bosch	M	‡Dyn	Ful	Ful	She W51	Wo	She	Ros	Smi	4550	8700
Maccar G-1	5	186	S-36x6	S-40x6d	Wis RBU	4-5 x6	Zeni	Eise	M	‡Bosch	B-L	B-L	Tim 6760	Wo	Tim	Ros	Day	....	8950
‡‡Mack AB	5††	122½	S*-36x4	S*-36x4d	Own	4-4¼x5	Zeni	Split	M	‡L-N	Own	Own	Own	Ch	Own	Own	Day	3400	5000
Mack AC	5	156	S*-36x6	S*-40x6d	Own	4-5 x6	Zeni	Split	M	‡L-N	Own	Own	Own	Ch	Own	Own	Day	5500	9400
Mack AC	6½	156	S*-36x6	S-40x12	Own	4-5 x6	Zeni	Split	M	‡L-N	Own	Own	Own	Ch	Own	Own	Day	5750	5900
Mack AC	7††	128	S*-36x5	S*-40x5d	Own	4-5 x6	Zeni	Split	M	‡L-N	Own	Own	Own	Ch	Own	Own	Day	4950	8700
Mack AC	7½	156	S*-36x7	S*-40x7d	Own	4-5 x6	Zeni	Split	M	‡L-N	Own	Own	Own	Ch	Own	Own	Day	6000	5850
Mack AC	10††	128	S*-36x6	S-40x6d	Own	4-5 x6	Zeni	Split	M	‡L-N	Own	Own	Own	Ch	Own	Own	Day	5500	9150
Mack AC	13††	128	S*-36x6	S-40x12	Own	4-5 x6	Zeni	Split	M	‡L-N	Own	Own	Own	Ch	Own	Own	Day	5750	9175
Mack AC	15††	128	S*-36x7	S-40x7d	Own	4-5 x6	Zeni	Split	M	‡L-N	Own	Own	Own	Ch	Own	Own	Day	6000	9500
†*Mapleleaf* DD	5	160	S-36x6	S-36x12	Hink HA1600	4-4½x5½	Stro	Eise	M	None	Ful	Ful	She W51	Wo	Sne	Ros	Smi	5625	8700
Master 61	5	158	S-36x5	S-40x12	Buda YTU	4-4½x6	Zeni	Eise	M	None	Ful	Ful	Tim 6760	Wo	Tim	Ros	Smi	....	8200
Master 64	5–6	170	S-36x6	S-40x14	Buda ATU	4-4¾x6½	Zeni	Eise	M	None	Ful	Ful	Tim 6760	Wo	Tim	Ros	Smi	....	9800
Menominee J3	5–6	160	S*-36x6	S-36x12	Wis RAU	4-4¾x6	Stro	Eise	M	‡Bosch	Det	Cot	Tim 6760	Wo	Con	Ros	Smi	4850	8200
National OA	5	164	S-36x6	S-40x6d	Wauk EU	4-5 x6¼	Zeni	Eise	M	‡N-E§§	H-S	B-L	Tim 6760	Wo	Tim	Ros	Smi	6150	9500
Old Reliable KLM	7½	124	S-36x6	S-40x14	Wauk P	4-4¾x6¾	Stro	Bosch	M	None	Own	Own	Own	Ch	Con	Ros	Bim	6000	14000
Pierce-Arrow RF	7½	204	S-36x6	S-40x8d	Own	4-4½x6¾	Stro	Delco	B	Delco	Cov	Own	Own	Wo	Own	Own	Bet	5200	9540
Pierce-Arrow RE	6	204	S-36x6	S-40x7d	Own	4-4½x6¾	Stro	Delco	B	Delco	Cov	Own	Own	Wo	Own	Own	Bet	5100	9540
Pierce-Arrow WD	5	198	S-36x6	S-36x7	Own	4-4½x6¾	Stro	Delco	B	Delco	Cov	Own	Own	Wo	Own	Own	Bet	4700	8490
Rainier R27	6	170	S-36x6	S-40x6d	Cont B5	4-4¾x6	Zeni	Eise	M	‡Delco	B-L	B-L	Tim 6760	Wo	Tim	Ros	Smi	....	9000
†Rowe FW	5	170	C-36x7	S-40x6d	Wis VAU	4-4½x6	Zeni	Bosch	M	Opt	B-L	B-L	She W51	Wo	She	Ros	Smi	4850	8240
Sanford 50	5–7	....	S-36x5	S-40x6d	Cont E4	4-4½x5½	....	....	....	....	B & B	B-L	She W51	Wo	....	....	....	....	....
Schacht G	5	168	S-36x5	S-40x7d	Wis VAU	4-4½x6	Zeni	Bosch	M	None	B & B	Own	Own	Wo	Own	Own	St M	4600	8200
Selden 90	5–7	166	S-36x6	S-40x12	Cont B6	4-4¾x6	Stro	Bosch	M	‡N-E	Det	B-L	Tim	Wo	Tim	Gem	Int	4950	9650
Service 103	6	173½	S*-36x6	S-40x12	Buda YBU	4-4½x6	Stro	Eise	M	‡Remy	B & B	B-L	Tim 6760	Wo	Tim	Ros	Sta	....	9150
†Signal M	5	168	S-36x5	S-40x10	Cont L4	4-4½x5½	Stro	Eise	M	‡Delco	B-L	B-L	Tim 6660	Wo	Tim	Ros	St M	....	7350
†Signal R	7½	180	S-36x6	S-40x12	Cont B5	4-4¾x6	Stro	Eise	M	‡Delco	B-L	B-L	Tim 6760	Wo	Tim	Ros	Day	....	9500
Standard 5K	7	164	S-36x6	S-40x14	Cont B5	4-4¾x6	Stro	Eise	M	‡Bosch	B-L	B-L	Tim 6760	Wo	Tim	Gem	Day	4495	8600
Standard 3½K	5	160	S-36x5	S-36x12	Cont L4	4-4½x5½	Stro	Eise	M	‡Bosch	B-L	B-L	Tim 6660	Wo	Tim	Gem	Day	....	7485
Sterling 5	5	168	S-36x6	S-40x6d	Wauk EU	4-5 x6¼	Zeni	Eise	M	‡Bosch	H S	Own	Tim 6760	Wo	Tim	Ros	Hoo	5210	9750
Sterling ELD	5	174	S-36x5	S-40x10	Wauk DU	4-4½x6¼	Zeni	Eise	M	‡Bosch	H S	Own	Own	Ch	Tim	Ros	Hoo	5420	8100
Sterling EHD	5	174	S-36x6	S-40x6d	Wauk EU	4-5 x6¼	Zeni	Eise	M	‡Bosch	H S	Own	Own	Ch	Tim	Ros	Smi	5810	10250
Sterling EHD	7½	174	S-36x6	S-40x7d	Wauk EU	4-5 x6¼	Zeni	Eise	M	‡Bosch	H S	Own	Own	Ch	Tim	Ros	Smi	7310	11000
†Tiffin TW	5–6	168	S-36x6	S-40x6d	Cont B2	4-4¾x6	Sche	Bosch	M	‡West	B & B	Cot	She W51	Wo	She	Ros	Smi	4300	8550
†Tiffin UW	6–7	168	S-36x6	S-40x12	Cont B2	4-4¾x6	Sche	Bosch	M	‡West	B & B	Cot	She W51	Wo	She	Ros	Smi	4500	9150
†Titan 5	5	156	S-36x5	S-40x12	Buda YTU	4-4½x6	Zeni	Eise	M	‡West	B & B	Cot	Own D R		Shu	Lav	Smi	4100	8500
Transport 75	5	170	S*-36x5	S*-36x12	Buda YTU	4-4½x6	Zeni	Eise	M	§Remy	B & B	Cot	Cla 3D	I G	Shu	Jac	Cla	....	7600
Traylor F	5	170	S*-36x5	S*-40x10d	Buda YTU	4-4½x6	Zeni	Bosch	M	§§West	B-L	B-L	She	Wo	She	Ros	Smi	4700	9200
†Ultimate D	5	180	S-36x7	S-40x7d	Buda BTU	4-5 x6½	Stro	Eise	M	‡Bosch	B-L	B-L	She W51	Wo	She	Ros	Smi	5500	8600
U. S. S	5	168	S-36x6	S-40x6d	Hink HA200	4-4½x5½	Stro	Eise	M	‡Bosch	B-L	B-L	She W31	Wo	She	Lav	Smi	4500	7480
U. S. T	6–7	172	S-36x7	S-40x7d	Buda ATU	4-4¾x6½	Stro	Eise	M	‡Bosch	B-L	B-L	She W51	Wo	She	Lav	Smi	5000	9470
‡‡Victor 80	6	160	S-36x5	S-36x10d	Cont L4	4-4½x5½	Zeni	Eise	M	None	Ful	Ful	Wis 120	D R	Shu	Lav	....	3150	6370
Walter FR	7½	136	S-36x6	S-40x7d	Wauk BU	4-4½x6¼	Zeni	Apol	M	West	M E	Own	Own I G		Own	Ros	Day	6500	9200
White 45 & 45D	5	156	S-36x6	S-40x6d	Own	4-4½x5¾	Zeni	....	M	‡L-N	Own	Own	Own D R		Own	Own	....	4500	8650
Wilcox F	5	162	S-36x5	S-40x12	Buda ATU	4-4¾x6½	Stro	Bosch	M	‡Opt	M E	Own	Wal 5A	D R	She	Own	Wal	....	9000

ABBREVIATIONS:

†—1923 Specifications
‡—Optional at extra cost
§§Generator Only
††—Truck, Tractor and Trailer
§—Starter Optional at extra cost
**—Make Optional
*—Pneumatics Optional
‡‡—Recommended for Bus Use
a—Starter Dyneto
A-L—Auto-Lite
Arc—Archibald
Arv—Arvac
Apol—Apollo
b—Starter N. E.
B&B—Borg & Beck
B-L—Brown-Lipe
Benn—Bennett
Bim—Bimel
Blo—Blood
Bud—Budd
c—Starter Westinghouse
Cam—Campbell
Cart—Carter
Cha—Chain
Cla—Clark
Col—Columbia
Conn—Connecticut
Cont—Continental
Cot—Cotta
Cov—Covert
d—Dual
Day—Dayton
Del—Detlaff
Det—Detroit
Dis—Disteel
Dod—Dodge
Dom—Dominion
DR—Double Reduction
Dyn—Dyneto
e—Bijur
Eat—Eaton
Eise—Eisemann
Ensi—Ensign
f—Auto-Lite
Fir—Firestone
Fli—Flint
Ful—Fuller
G&D—Gray & Davis
Gem—Gemmer
Goo—Goodrich
HaS—Hall Scott
Har—Hartford
Hay—Hayes
Herc—Hercules
HeS—Hele-Shaw
Hink—Hinkley
Hoo—Hoops Bros & Darlington
Hoo—Hoosier
H-S—Herschell-Spillman
IG—Internal Gear
Ind—Indestructible
Jac—Jacox
John—Johnson
Jon—Jones
Kel—Kelsey
Lav—Lavine
L-N—Leece-Neville
Lyc—Lycoming
Marv—Marvel
Mast—Master
Mea—Mead
Mec—Mechanics
McC—McCanna
Mic—Michelin
Midw—Midwest
Mot—Motor Wheel Corp.
Mun—Muncie
Mut—Mutual
N-E—North-East
Nor—Northern
Pet—Peters
Pic—Pick
Pie—Pierce
Prest—Prest-O-Lite
Pru—Prudden
Rayf—Rayfield
Ros—Ross
Roy—Royer
Rus—Russell
Sal—Salisbury
Sav—Savage
SB—Spiral Bevel
Sch—Schwartz
Sche—Schebler
She—Sheldon
Shu—Shuler
Sim—Simms
Smi—Smith
Sne—Snead
Spi—Spicer
Split—Splitdorf
Sta—Standard
Stew—Stewart
Stro—Stromberg
The—Thermod
Tho—Thompson
Tim—Timken
Tor—Torbenson
TR—Triple Reduction
Uni—Universal
Wal—Walker
War—Warner
Wauk—Waukesha
West—Westinghouse
Wisc—Wisconsin
Wo—Worm
Woh—Wohlrab
Zeni—Zenith

Italics Indicates—
Canadian Manufacturers

It is a suggestion by MOTOR AGE that the dealer and his staff of salesmen and maintenance men preserve this issue carefully owing to the comprehensive specifications of motor vehicles. The specifications are invaluable to everyone connected in any way with either the selling or maintenance of automotive vehicles.

Mechanical Specifications of

MAKE AND MODEL	GENERAL										ENGINE															
																		Governor		Ignition		Fuel System				
	Price	Capacity: No. of 14" Plows	Plowing Speed (M. P. H.)	Wgt. Complete (Lbs.)	Wheel Base (Ins.)	Minimum Turning Diameter (Ft.)	Ground Clearance (Ins.)	Drawbar Type	Drawbar—Belt Rating	Steering Type	Make	Rated Horsepower (N.A.C.C.)	Number Cylinders	Bore and Stroke	Engine Type	No. of Cyls. per Casting	Valve Arrangement	Normal R.P.M. at Plowing Speed	Make	Type	Make of System	Impulse Starter Fitted?	Make and Size of Carbureter (Ins.)	Fuel Feed	Number and Capacity of Fuel Tanks (gals.)	Water Injected?	Make of Air Cleaner
Adv.-Rumely OilPull..K	....	3	2.90	6638	80	14′ 0″	13⅞	Hor.	12–20	F.A.K.	Own	28.80	2	6 x8	Hor	2	IH	560	Own	Cent.	Bosch.	Yes.	Own 2¼	Pres.	2-1G-23K	Yes.	Don.
Adv. Rumely OilPull..H	....	4	2.10	9506	92½	17′ 0″	15½	Hor.	16–30	F.A.K.	Own	39.20	2	7 x8½	Hor.	2	IH	530	Own	Cent.	Bosch.	Yes.	Own 2½	Pres.	2-1G-34K	Yes.	Don.
Adv.-Rumely OilPull..G	....	6	2.00	12968	103	21′ 0″	17⅜	Hor.	20–40	F.A.K.	Own	51.20	2	8 x10	Hor.	1	IH	450	Own	Cent.	Bosch.	Yes.	Own 2¾	Pres.	2-1G-41K	Yes.	Don.
Adv.-Rumely OilPull..E	....	8–10	1.90	26000	141	....	15	Hor.	30–60	S.A.	Own	80.00	2	10 x12	Hor.	1	IH	375	Own	Cent.	Bosch.	No.	Own 3¼	Pres.	2-3G-70K	Yes	None.
Allis-Chalmers	$325	1	2.40	2500	81	9′ 11″	26½	Ver.	6–12	T.D.M.	LeRoi.	15.63	4	3½x4½	Ver.	4	"L"H.	1200	LeRoi.	Cent.	Dixie.	No.	King ⅞	Gra.	1-G- 8½	No.	Ben...
Allis-Chalmers	1285	3	2.50	4700	78	12′ 0″	13	Uni.	15–25	F.A.K.	Midw.	27.23	4	4½x5¼	Ver.	2	IH	1100	Own	Cent.	Dixie.	Yes.	King 1¼	Gra.	1-G-20	No.	Taco.
Allwork	1295	3	2.75	5200	80	12′ 0″	14	Uni.	16–30	F.A.K.	Own	40.00	4	5 x6	Ver.	1	"L"H.	900	Own	Cent.	Bosch.	Yes.	King 1½	Gra.	3-G-40	No.	Taco.
Allwork	1495	3	2.75	4800	75	9′ 6″	13	Uni.	14–28	F.A.K.	Own	36.10	4	4¾x6½	Ver.	4	IH	930	Own	Cent.	Dixie.	Yes.	King 1½	Gra.	2-5G-25K	No.	Ben...
Allwork	1695	4–5	2.75	6500	80	26′ 0″	14	Ver.	20–38	F.A.K.	Own	40.00	4	5 x7	Ver.	1	"L"H.	900	Own	Cent.	Bosch.	Yes.	King 1½	Gra.	2-5G-25K	No.	Ben...
Aultman-Taylor	3100	4–6	2.20	12500	102	28′ 0″	12	Hor.	22–45	S.A.	Own	48.40	4	5 x7	Ver.	1	"L"H.	900	Own	Cent.	Bosch.	Yes.	King 1.½	Gra.	2-5G-25K	No.	Ben...
Aultman-Taylor	4400	8–10	2.20	22500	125	32′ 0″	13	Hor.	30–60	S.A.	Own	78.40	4	7 x9	Hor.	2	IH	600	Own	Cent.	Eise.	Yes.	King 2	Gra.	2-20G-50K	Yes	None.
Avery	....	3–4	2.50	4500	70	....	....	Hor.	15–	F.A.K.	Own	32.40	4	4½x6	Hor.	4	IH	550	Own	Cent.	Eise.	Yes.	King 2½	Gra.	2-20G-60K	Yes	None.
Avery	....	4–5	3.00	7500	80	12′ 0″	16	Hor.	20–35	F.A.K.	Own	38.03	4	4⅞x7	Hor.	4	IH	....	Pierce.	Cent.	K.W.	Yes.	Strom 1¼	Gra.	2-2G-16K	No.	Ben...
Avery	....	5–6	4.00	12500	114	20′ 0″	16	Hor.	25–50	S.A.	Own	67.60	4	6½x7	Hor.	2	IH	700	Own	Cent.	K.W.	Yes.	King 1½	Gra.	2-3½G-30K	Yes	.....
Avery	....	8–10	3.00	22000	138	20′ 6″	20	Hor.	45–65	S.A.	Own	96.10	4	7¾x8	Hor.	2	IH	500	Own	Cent.	K.W.	Yes.	King 2	Gra.	2-5G-50K	Yes	.....
‡Avery (Track Runner)	....	3	2.66	5000	.....	9′ 0″	....	Uni.	.....	T.D.M.	Own	25.60	4	4 x5½	Ver.	4	IH	1000	Pharo.	Hyd.	K.W.	Yes.	King 1¼	Gra.	2-2G-23K	No.	United
‡Avery...(Road Razer)	....	....	....	4600	....	....	....	Hor.	.....	F.A.K.	Own	21.60	6	3 x4	Ver.	6	"L"H.	1250	Own	Cent.	K.W.	Yes.	King 1...	Gra.	1-20G	No.	Ben...
Bates (Steel Mule)...H	....	3	2⅓	3600	82½	20′ 0″	12	Hor.	15–25	F.A.K.	Midw	27.23	4	4⅛x5¼	Ver.	2	IH	1100	Simp.	Cent.	Bosch.	Yes.	Ben. 1¼	Gra.	2-8G-10K	....	Pom.
Bates (Steel Mule)...F	....	3	2⅓	4850	80	16′ 0″	12	Hor.	18–25	F.A.K.	Midw.	27.23	4	4⅛x5¼	Ver.	2	IH	1100	Simp.	Cent.	Bosch.	Yes.	Ben. 1¼	Gra.	2-8G-10K	....	Pom.
Bates (Steel Mule)...G	....	4	2⅓	6500	80½	13′ 6″	12	Hor.	25–35	F.A.K.	Midw.	32.40	4	4½x6	Ver.	2	IH	1000	Simp.	Cent.	Bosch.	Yes.	King 1½	Gra.	1-26G	....	Pom.
‡Bates (Steel Mule)..40	....	....	....	9500	84	14′ 0″	14	Hor.	30–40	T.D.M.	Midw.	36.10	4	4¾x6	Ver.	2	IH	1000	Simp.	Cent.	Bosch.	Yes	King 1½	Gra.	1-30G	No.	Pom.
Bear	4250	4	3.80	6500	64	12′ 0″	11	Uni.	25–35	T.D.M.	Stearns	36.10	4	4¾x6½	Ver.	4	IH	1290	Dupl'x	Cent.	Bosch.	Yes	Scheb 1¾	Gra.	1-40G	No.	Pom.
Best	....	4	3.10	8100	.....	12′ 0″	11½	Hor.	20–30	T.D.M.	Own.	36.10	4	4¾x6½	Ver.	1	IH	800	Own.	Cent.	Bosch.	Yes.	Ensign1½	Gra.	2-2½G-28K	No.	Pom.
Best	....	8	2.62	18580	.....	18′ 0″	14	Hor.	40–60	T.D.M.	Own.	67.60	4	6½x8½	Ver.	1	IH	650	Own.	Cent.	Bosch.	Yes.	Ensign 2	Vac	2-3G-56K	No.	Pom.
Bryan.....Steam	2385	3	2.50	5500	88	14′ 0″	15	Hor.	15–30	F.A.K.	Own.	20.00	2	4 x5	Hor.	2	Slide.	300	Pick.	Cent.	None.	No.	None	Pres.	1-30K	No.	None.
Case	895	3	2.60	4230	65	24′ 0″	11½	Hor.	12–20	F.A.K.	Own.	27.23	4	4½x5	Ver.	4	IH	1050	Own.	Cent.	Bosch.	Yes.	King 1¼	Gra.	2-2¼G-17¼K	No.	Own.
Case	1350	3–4	2.75	6600	76½	27′ 3″	14	Hor.	15–27	F.A.K.	Own.	37.40	4	4½x6	Ver.	4	IH	900	Own.	Cent.	Bosch.	Yes.	King 1⅜	Gra.	2-2¾G-20K	Yes.	Own.
Case	2650	4–6	2.60	10700	96	40′ 6″	15	Hor.	22–40	F.A.K.	Own.	48.40	4	5½x6¾	Ver.	2	IH	850	Own.	Cent.	Bosch.	Yes.	King 2	Gra.	2-3¾G-26¼K	Yes	Own.
Case	4900	8–10	2.60	21200	124	52′ 6″	16	Hor.	40–72	F.A.K.	Own.	78.40	4	7 x8	Ver.	2	IH	750	Own.	Cent.	Bosch.	Yes.	King 2½	Gra.	2-9G-52K	Yes	Own
Caterpillar.....2 Ton	....	3	3.00	4000	.....	11′ 0″	11	Hor.	15–	T.D.M.	Own.	25.60	4	4 x5½	Ver.	4	IH	1000	Own.	Cent.	Eise.	Yes.	King 1¼	Gra.	1-19G	No.	Bailey
‡Caterpillar.....5 Ton	....	4	3.00	9400	83	14′ 0″	12	NonA.	25–	T.D.M.	Own.	36.10	4	4¾x6	Ver.	4	IH	1050	Own.	Cent.	Eise.	Yes.	Scheb 1½	Vac.	1-46-G	No.	Strom.
‡Caterpillar....10 Ton	....	6	3.00	19500	98	18′ 0″	17	NonA.	40–	T.D.M.	Own.	67.60	4	6½x7	Ver.	1	IH	750	Own.	Cent.	Eise..	Yes.	King 2...	Gra.	1-46-G	No.	Strom.
Cletrac.....F	815	2	3.00	1930	.....	16′ 0″	8	Hor.	9–16	T.D.M.	Own.	16.90	4	3¼x4½	Ver.	4	"L"H.	1600	Own.	Cent.	Teagle	No.	Tillot 1...	Gra.	2-¼G-6K	No.	Own
Cletrac.....W	1345	2	3.00	3455	.....	12′ 0″	12	Hor.	12–20	T.D.M.	Own.	25.60	4	4 x5½	Ver.	4	IH	1265	Own.	Cent.	Teagle	Yes.	King 1¼	Gra.	2-¾G-11K	No.	Own.
Eagle.....F	....	3	2.00	5850	81	.....	17	Hor.	12–22	S.A.	Own.	39.20	2	7 x8	Hor.	2	IH	450	Pick.	Cent.	Dixie.	Yes.	Scheb 1½	Gra.	2-4G-12K	Yes	Own.
Eagle.....H	....	4	2.00	7100	88	.....	17	Hor.	16–30	F.A.K.	Own.	51.20	2	8 x8	Hor.	2	IH	450	Pick.	Cent.	Dixie.	Yes.	Scheb 1¾	Gra.	2-5G-18K	Yes.	Own.
E-B.....AA	....	3	2.70	4550	87½	12′ 6″	11	Hor.	12–20	F.A.K.	Own.	36.10	4	4¾x5	Ver.	2	"L"H.	900	Own.	Cent.	K-W.	Yes.	Strom 1½	Gra.	2-4G-20K	Yes	Ben...
E-B.....Q	....	3	2.26	6500	93	15′ 0″	15	Hor.	12–20	F.A.K.	Own.	36.10	4	4¾x5	Ver.	2	"L"H.	850	Pick.	Cent.	K-W.	Yes.	Ben. 1½	Gra.	2-4G-16K	Yes.	Ben...
E-B.....	....	4	2.26	9400	126	22′ 0″	16	Hor.	16–32	S.A.	Own.	44.10	4	5¼x7	Ver.	2	"L"H.	750	Pick.	Cent.	Simms	Yes.	Strom 1¾	Gra.	2-5G-35K	Yes.	Ben...
Fageol	1175	2	2.33	3600	77	....	....	Hor.	9–12	F.A.K.	Lyco.	19.60	4	3½x5	Ver	4	"L"H.	1200	.....	Cent.	Dixie.	Yes.	Tillot 1...	Gra.	1-12G	No.	Own.
Fordson	420	2	2.75	2562	63	21′ 0″	11⅜	Hor.	–18	F.A.K.	Own.	25.60	4	4 x5	Ver.	4	"L"H.	1000	None.	None.	Own	No.	Holley 1¼	Gra.	2-1½G-21K	Yes	Own.
Frick	....	2	2.30	5800	92	12′ 6″	15	Hor.	12–20	F.A.K.	Erd.	25.60	4	4 x6	Ver	4	IH	900	Erd.	Cent	King.	Yes.	King 1¼	Gra.	2-3G-20K	No.	King.
Frick	....	3	2.13	6730	92	12′ 6″	16	Hor.	15–28	F.A.K.	Beav.	36.10	4	4¾x6	Ver.	4	IH	900	Taco.	Cent.	Dixie.	Yes.	Ben. 1½	Gra.	2-3G-20K	No.	United
Gray	....	4	3.14	6900	140	12′ 6″	18	NonA.	22–40	F.A.K.	Wauk	32.40	4	5x6¼	Ver.	2	"L"H.	1000	Wauk	Cent.	Bosch.	Yes	Ben. 1½	Gra.	1-35G	No.	Ben...
Hart-Parr.....20	....	2	3.00	4250	76	22′ 0″	11⅜	Hor.	–20	F.A.K.	Own.	24.20	2	5½x6½	Hor.	2	IH	800	Own.	Cent.	K-W.	Yes.	Scheb 1½	Gra.	2-1G-14K	Yes	Own.
Hart-Parr.....30	....	3	3.00	5220	83	24′ 0″	11⅜	Hor.	–30	F.A.K.	Own.	33.80	2	6½x7	Hor.	2	IH	750	Own.	Cent.	K-W.	Yes.	Scheb 1½	Gra.	2-1G-23K	Yes	Own
‡Hart-Parr.....(Road)	....	3	3.00	7560	83	24′ 0″	11⅜	Hor.	–30	F.A.K.	Own.	33.80	2	6½x7	Hor.	2	IH	750	Own.	Cent	K-W.	Yes.	Scheb 1½	Gra.	2-1G-23K	No.	Own.
Hart-Parr.....40	....	4	3.11	7510	91	24′ 0″	11⅜	Hor.	–40	F.A.K.	Own.	45.00	4	6½x6½	Hor.	2	IH	750	Own.	Cent.	K-W.	Yes	Scheb 1½	Gra.	2-1G-23K	Yes	Own
Heider.....D	628	2	2.50	4000	90	25′ 0″	12	Uni.	9–16	F.A.K.	Wauk	28.90	4	4¼x5¾	Ver.	2	"L"H	1000	Wauk	Cent.	Dixie.	Yes	King 1...	Gra.	2-7G-14K	Yes	Ben...
Heider.....C	725	3	2.50	6000	96	25′ 0″	12	Uni.	12–20	F.A.K.	Wauk.	32.40	4	4½x6¾	Ver.	2	"L"H.	900	Wauk.	Cent.	Dixie..	Yes.	King 1¼	Gra.	2-7G-14K	Yes	Ben...
Heider.....M-2	....	....	2.50	2800	80	4′	8″	30	Hor.	5–10	F.A.K.	LeRoi.	15.63	4	3½x4½	Ver.	4	"L"H.	1000	LeRoi.	Cent.	Dixie.	Yes.	King ⅞	Gra.	2-2½G-22K	Yes	Ben...
Huber....(Light Four)	985	3	2.50	5000	91	12′ 0″	16	Uni.	12–25	F.A.K.	Wauk	32.40	4	4½x5¾	Ver.	2	"L"H.	1000	Wauk	Cent.	King.	Yes.	King 1¼	Gra.	2-2½G-22K	Yes	Ben...
Huber..... (Super 4)	....	3	2.80	6000	91	12′ 3″	16	Uni.	15–30	F.A.K.	Midw.	32.40	4	4½x6	Ver.	2	IH	1100	Taco.	Cent.	Eise..	Yes.	King 1¼	Gra.	1-24½G	No.	United
LaCrosse.....M	....	1	2.50	3000	72	8′ 6″	30	Hor.	6–12	F.A.K.	Own.	12.80	2	4 x6	Hor.	2	IH	1000	Own.	Cent.	A-K.	....	King-1¼	Gra.	2-1G-13K	No.	.....
LaCrosse.....H	....	3	3.00	3800	90	9′ 6″	14	Hor.	12–24	F.A.K.	Own.	28.80	2	6 x7	Hor.	2	IH	900	Own.	Cent.	A-K.	....	King 1¾	Gra.	2-5G-25K	Yes	Ben...
Lauson.....S	1295	3	3.00	4200	78	13′ 0″	....	Hor.	12–25	F.A.K.	Midw.	27.23	4	4½x5¼	Ver.	2	IH	1200	Taco.	Cent.	Dixie.	Yes.	King 1¼	Gra.	1-20G	No.	Taco.
Lauson.....T	1675	4	2.50	6200	86	14′ 0″	12	Hor.	15–30	F.A.K.	Beav.	36.10	4	4¾x6	Ver.	4	IH	1000	Taco.	Cent.	Dixie.	Yes.	King 1⅝	Gra.	2-5G-15K	No.	Taco.
Leader.....B	4375	2	2.50	4800	84	15′ 0″	18	Hor.	12–18	F.A.K.	Own.	28.80	2	6½x6	Opp.	1	"L"H.	800	Own.	Cent.	King.	Yes.	King 1½	Gra.	2-2½G-18K	Yes	Own.
Leader.....N	1275	3–4	2.25	5800	76	15′ 0″	8	Hor.	16–32	F.A.K.	Climax	40.00	4	5 x6	Ver.	2	"L"H.	800	Climax	Cent.	Eise..	Yes.	Strom 1½	Gra.	2-3½G-30K	No.	Ben...
Lincoln.....A	1600	3	2.50	5000	90	30′ 0″	15	Ver.	15–30	F.A.K.	Buda.	32.40	4	4½x6	Ver.	4	"L"H	950	Pierce.	Cent.	Split.	Yes.	Strom 1¼	Gra.	2-5G-20K	No.	Stayn.
Little Giant.....B	....	4	2.50	5200	87	14′ 0″	12½	Hor.	16–22	F.A.K.	Own.	32.40	4	4½x5	Ver.	2	"L"H.	900	Own.	Cent.	King.	Yes.	King 1½	Gra.	2-5G-25K	No.	Don..
Little Giant.....A	....	6	2.50	8700	102	16′ 0″	14½	Hor.	26–35	F.A.K.	Own.	48.40	4	5½x6	Ver.	2	"L"H.	700	Pick.	Cent.	King.	Yes.	King 2...	Gra.	2-5G-20K	No.	Don..
Lombard	....	12-16	....	19000	168	23′ 0″	10	Hor.	–100	F.A.K.	Own	79.35	6	5¾x7	Ver.	2	"L"H.	1200	Special	Cent.	Special	....	Special...	Vac.	1-65G	No.	.....
London	....	3	2.40	.....	83	9′ 0″	....	Uni.	12–25	.....	Midw.	27.23	4	4½x5¼	Ver.	4	I.H.	1200	Taco.	Cent	K-W.	....	Colum1¼	Gra.	1-24G	No.	.....
McCormick-Deering	....	2	3.00	3700	78	15′ 0″	....	Uni.	8–16	F.A.K.	Own.	28.90	4	4¼x5	Ver.	1	IH	1000	Own.	Cent.	Dixie.	Yes.	Ensign	Gra.	2-3½G-14½K	No.	Own.
McCormick-Deering	....	3	3.00	5750	85	15′ 0″	11	Uni.	15–30	F.A.K.	Own.	32.40	4	4½x6	Ver.	1	IH	1000	Own.	Cent.	Split.	Yes.	Ensign...	Gra.	2-1G-17K	Yes	Own.
Minneapolis	....	3	2.21	6600	100	17′ 1″	....	Hor.	12–25	F.A.K.	Own.	32.40	4	4½x7	Ver.	4	IH.	750	Own	Cent.	K-W.	....	King 1½	Gra.	2-3G-18.3K	Yes	Ben...
Minneapolis	....	3–4	2.75	6400	79⅞	13′ 6″	14	Uni.	17–30	F.A.K.	Own.	36.10	4	4¾x7	Ver.	....	IH.	775	Own.	Cent.	Bosch.	....	King 1¾	Gra.	2-6G-18K	....	Don..
Minneapolis	....	4–5	2.70	12410	109½	15′ 3″	17	.....	22–44	S.A.	Own.	37.60	4	6 x7	Hor.	2	IH.	700	Own.	Cent.	K-W.	....	King 2...	Gra.	2-9G-30K	.....	.....
Minneapolis	....	8–10	2.10	22500	136	20′ 6″	16	NonA.	35–70	S.A.	Own.	87.52	4	7¼x9	Hor.	2	IH.	550	Own.	Cent.	K-W.	....	King 2½	Gra.	2-20G-80K	.....	.....
Moline..(UniversalD3)	725	2–3	3.25	3380	....	16′ 0″	29	Uni.	9–18	Special	Own	19.60	4	3½x5	Ver.	4	IH	1400	Remy.	Elec.	Remy.	No.	Holley 1¼	Gra.	1-15G	No.	Ben...
Moline....(Orchard D)	725	2–3	3.00	3340	.....	16′ 0″	19	Uni.	9–18	Special	Own.	19.60	4	3½x5	Ver.	4	IH	1400	Remy.	Elec..	Remy.	No.	Holley 1¼	Gra.	1-15G	No.	Ben...
‡Monarch.....C	3800	4	2.40	8700	.....	14′ 0″	16	Hor.	20–30	T.D.M.	Beav.	36.10	4	4¾x6	Ver.	4	I.H.	1050	Taco.	Cent	K-W.	Yes	King 1½	Gra.	2-5G-20K	Yes	Ben...
‡Monarch.....E	5000	....	....	12000	.....	14′ 0″	16	Hor.	25–40	T.D.M.	Beav.	36.10	4	4¾x6	Ver.	4	I.H.	1200	Pharo.	Hyd.	Bosch	Yes	Strom 1¾	Vac.	1-45G	Yes	Ben...
‡Monarch.....D	6000	....	....	15000	.....	16′ 0″	12	Hor.	35–60	T.D.M.	Beav.	54.15	6	4¾x6	Ver.	2	I.H.	1200	Pharo.	Hyd.	Bosch.	Yes.	Strom 1¾	Vac.	1-45G	Yes	Ben...

ABBREVIATIONS:
‡—Industrial Tractor

Drawbar Type:
Hor—Horizontal
Ver—Vertical
Uni—Universal
Non-A—Non-Adjustable

Steering Gear Type:
F. A. K.—Front Axle Knuckle
S. A.—Swinging Axle
T. D. M.—Thru Driving Members

ENGINE:
Midw—Midwest
Lyco—Lycoming
Beav—Beaver
Wauk—Waukesha
Weid—Weidley
Wis—Wisconsin
Ver—Vertical
Hor—Horizontal
Opp—Opposed
"L" H—"L" Head
"T" H—"T" Head
I. H.—In Head
Pick—Pickering
Cent—Centrifugal
Elec—Electrical
Suct—Suction
Hyd—Hydraulic
Eise—Eisemann
Split—Splitdorf
A-K—Atwater-Kent
King—Kingston
Ben—Bennett
Strom—Stromberg
Tillot—Tillotson
Scheb—Schebler
Colum—Columbia
Gra—Gravity
Pres—Pressure
Vac—Vacuum
G—Gasoline
K—Kerosene
Stayn—Staynew
Rains—Rainstrom
Don—Donaldson
Ben—Bennett

1924 Agricultural Tractors

ENGINE						CLUTCH		BELT PULLEY				TRANSMISSION																		
Oiling System		Cooling System																												
Type of System	Type of Pump	Make of Radiator	Circulation By	Capacity of System (Gals.)	Fluid	Make	Type	Diameter (Ins.)	Face (Ins.)	Normal R.P.M.	Clutch Type	Make	Type	Number of Forward Speeds	Final Drive	Diameter and Face Traction Members (Ins.)	Drive from Gearset to Traction Members	Drive Taken Through	Drive Wheel Axle Type	Does Differential Lock?	Type: Drive Shaft Axle Bearings	Individual Brakes for Steering?	Individual Clutches for Steering?	Number of Non-Drive Wheels	Frame Type	MAKE AND MODEL
M.F.M.O.	Pist...	Own..	Pump..	10½	O...	Own...	E.S....	19	7	560	Spec...	Own..	S.G..	2	Wheel.	51-12	S.G....	Rim..	Rev...	No...	Roller.	No..	No.	2	Roll...	Adv.-Rumely OilPull K
M.F.M.O.	Pist...	Own..	Pump..	15	O...	Own...	E.S....	23	8½	530	Spec...	Own..	S.G..	2	Wheel.	56-16	S.G....	Rim..	Rev...	No...	Roller.	No..	No.	2	Roll...	Adv.-Rumely OilPull H
M.F.M.O.	Pist...	Own..	Pump..	17	O...	Own...	E.S....	26	9	450	Spec...	Own..	S.G..	2	Wheel.	64-20	S.G....	Rim..	Rev...	No...	Roller.	No..	No.	2	Roll...	Adv.-Rumely OilPull G
M.F.M.O.	Pist...	Own..	Pump.	70	O...	Own...	E.S....	36	11	375	Spec...	Own..	S.G..	1	Wheel.	80-30	S.G....	Rim..	Dead..	No...	Plain..	No..	No.	2	Roll...	Adv.-Rumely OilPull. E
Cir.Spl....	Pist...	Own..	Th-S..	3½	W..	B&B...	S.P....	10	5½	1200	None...	Own..	S.G...	1	Wheel.	48- 6	S.&I.G.	Rim..	Dead..	No...	Plain..	No..	No.	2	No F..	Allis-Chalmers
Hol. Crk..	Gear..	Own..	Pump.	6	W..	Own...	E.S....	12½	6½	817	None...	Own..	S.G...	2	Wheel.	46-12	I.G....	Rim..	Rev...	No...	Roller	No.	No.	2	No F..	Allis-Chalmers
Hol.Crk...	Gear..	Own..	Pump.	10	W..	Own...	E.S....	13	7½	930	None...	Own..	S.G...	2	Wheel.	50-12	I.G....	Rim..	Rev...	No...	Roller	No..	No.	2	No F..	Allis-Chalmers
Cir.Spl....	Ecc...	Perf...	Pump..	12	W..	Own...	M.D.D.	13¾	7½	900	M.D.D.	Own..	S.G...	3	Wheel.	48-12	S.G....	Rim..	Rev...	No...	Roller	No..	No.	2	Roll...	Allwork C
Cir.Spl....	Ecc...	Perf...	Pump..	10	W..	Own...	M.D.D.	11	7	900	M.D.D.	Own..	S.G...	3	Wheel.	48-12	S.&WG	Rim..	Rev...	No...	Roller	Yes.	No.	2	Roll...	Allwork G
Hol.Crk...	Gear..	Perf...	Pump..	12	W..	Own...	M.D.D.	14	7½	900	M.D.D.	Own..	S.G...	3	Wheel.	48-14	S.G....	Rim..	Rev...	No...	Roller	No.	No.	2	Roll...	Allwork D
M.F.M.O.	Pist..	Own..	Pump.	80	W..	Own...	C.B....	20	11	600	E.S....	Own..	S.G...	2	Wheel.	70-20	S.G....	Rim..	Rev...	No...	Plain.	No.	No.	2	Roll...	Aultman-Taylor
M.F.M.O.	.....	Own..	Pump.	120	W..	Own...	C.B....	24	11	550	E.S....	Own..	.....	1	Wheel.	90-24	S.G....	Rim..	Rev...	No...	Plain.	No.	No.	2	Roll...	Aultman-Taylor
M.F.M.O.	Gear..	Own..	Pump.	.....	W..	Own...	M.D.D.	16	7⅜	900	M.D.D.	Own..	S.G..	2	Wheel.	50-12	S.G....	Axle..	Live..	No...	Ball...	Yes.	No.	2	Roll...	Avery
M.F.M.O.	Gear..	Own..	Pump.	.....	W..	Own...	M.D.D.	16	7½	900	M.D.D.	Own..	S.G..	2	Wheel.	60-16	S.G....	Spokes	Rev...	No...	Plain.	No..	No.	2	Roll...	Avery
M.F.M.O.	Gear..	Own..	Pump.	55	W..	Own...	M.D.D.	22	8½	700	M.D.D.	Own..	S.G..	2	Wheel.	69-20	S.G....	Spokes	Rev...	No...	Plain.	No..	No.	2	Roll...	Avery
M.F.M.O.	Gear..	Own..	Pump.	.....	W..	Own...	M.D.D.	26	10	600	M.D.D.	Own..	S.G..	2	Wheel.	87½-24	S.G....	Spokes	Rev...	No...	Plain.	No..	No.	2	Roll	Avery
Hol.Crk...	Gear..	Own..	Pump.	6¾	W..	T.Disc.	S.P....	12	6½	1000	.....	Own..	S.G..	3	Track	-8½	S.G....	Spokes	Rev...	No...	Ball..	Yes.	Yes.	0	Roll...	‡Avery (Track Runner)
Cir.Spl....	Gear..	Own..	Th-S...	6¾	W..	Own...	M.D.D.	.....	.....	.....	.....	Own..	S.G..	3	Wheel.	42- 6	S.G....	Spokes	Dead..	No...	Roller.	Yes.	No..	1	Roll...	‡Avery...(Road Racer)
Hol.Crk...	Gear..	Perf...	Pump..	6	W..	T.Disc.	S.P....	12	8½	850	S.P....	Own..	S.G..	2	Wheel.	48-10	S.G....	Axle..	Dead..	No...	Roller.	.....	.....	2	Roll...	Bates (Steel Mule)...H
Hol.Crk...	Gear..	Perf...	Pump..	6	W..	B&B...	S.P....	12	8½	850	S.P....	Own..	S.G..	2	Track	56-10	S.G....	Axle..	Dead..	Yes..	Roller	Yes.	No..	2	Roll...	Bates (Steel Mule)...F
Hol.Crk...	Gear..	Perf...	Pump.	10	W..	T.Disc.	S.P....	12	8½	850	S.P....	Own..	S.G..	2	Track	56-10	S.G....	Axle..	Dead..	Yes..	Roller	Yes.	No..	2	Roll...	Bates (Steel Mule)...G
Hol.Crk...	Gear..	Perf...	Pump.	10	W..	B&B...	S.P....	12	8½	850	S.P....	Own..	S.G..	3	Track	84-12	S.G....	.....	.....	.....	Roller.	Yes.	Yes.	....	Roll...	‡Bates (Steel Mule) 40
Hol.Crk...	Gear..	Mod..	Pump.	14	W..	M&E...	M.D.D.	12	9	1200	None...	Own..	S.G..	3	Track	-12	I.G....	.....	.....	.....	Ball...	Yes.	Yes.	8	Roll...	dear B
Hol.Crk...	Gear..	Own..	Pump.	11	W..	Own...	M.D.D.	12	8	800	None...	Own..	S.G..	2	Track	68-11½	B.G....	.....	.....	.....	Roller.	Yes.	Yes.	0	No F..	Best 30
Cir.Spl....	Gear..	Own..	Pump.	16	W..	Own...	S.P....	16	10	650	None...	Own..	S.G..	3	Track	89-20	SG-BG.	.....	.....	.....	Roller.	Yes.	Yes.	.....	.....	Best 60
M.F.M.O.	Pist...	.....	.....	.....	W..	None...	None...	18	7	300	None...	Own..	S.G..	Var.	Wheel.	52-12	S.G....	Axle..	Live..	Yes..	Roller	No..	No..	2	Roll...	Bryan Steam
Hol.Crk...	Gear..	Own..	Pump.	10	W..	T.Disc.	S.P....	14¼	6⅜	1050	S.P....	Own..	S.G..	2	Wheel	42-12	S.G....	Spokes	Live..	Yes..	Roller	No..	No..	2	No F..	Case
Hol.Crk...	Pist...	Own..	Pump.	11	W..	B&B...	S.P....	16	6½	900	S.P....	Own..	S.G..	2	Wheel	52-14	S.G....	Spokes	Live..	Yes..	Roller	No..	No..	2	No F..	Case
Hol.Crk...	Gear..	Own..	Pump.	15½	W..	Own...	E.S....	16½	8½	850	E.S....	Own..	S.G..	2	Wheel	56-16	S.G....	Spokes	Rev...	Yes..	Roller	No..	No..	2	Roll...	Case
Hol.Crk...	Gear..	Own..	Pump.	.....	W..	T.Disc.	S.P....	19½	10½	750	S.P....	Own..	S.G..	2	Wheel	72-20	S.G....	Spokes	Rev...	Yes..	Roller	No..	No..	2	Roll...	Case
Hol.Crk...	Gear..	Own..	Pump.	6	W..	Own...	M.D.D.	11½	6½	1000	S.G....	Own..	S.G..	3	Spur	.....	S.G....	.....	Dead..	None	Roller	Yes.	Yes.	0	No F..	Caterpillar 2 Ton
Hol.Crk...	Gear..	Own..	Pump.	7½	W..	Own...	M.D.D.	12	8½	1000	J.C....	Own..	S.G..	3	Spur	.....	S.G....	.....	Dead..	None	Roller	Yes.	Yes.	0	No F..	‡Caterpillar 5 Ton
Hol.Crk...	Gear..	Own..	Pump.	13½	W..	Own...	M.D.D.	14	10½	850	J.C....	Own..	S.G..	3	Spur	.....	S.G....	.....	Dead..	None	Roller	Yes.	Yes.	0	No F..	‡Caterpillar 10 Ton
Cir.Spl....	Gear..	McC..	Pump.	3⅔	W..	B&B...	S.P....	7	5	1600	None...	Own..	S.G..	1	Track	42-5½	S.G....	Axle..	.....	No...	Ball...	Yes.	No.	0	No F..	Cletrac F
Hol.Crk...	Gear..	McC..	Pump.	.....	W..	B&B...	S.P....	8	6	1265	None...	Own..	S.G..	1	Track	48-8	S.G....	Axle..	.....	No...	Roller.	Yes.	No.	0	Roll...	Cletrac W
M.F.M.O.	Ecc...	Perf...	Pump	12	W..	Own...	E.S....	20	8½	450	E.S....	Own..	S.G..	2	Wheel	48-12	S.G....	Rim..	Rev...	No.	.....	No.	No..	2	Roll...	Eagle F
M.F.M.O.	Ecc...	Perf...	Pump.	15	W..	Own...	E.S....	24	10	450	E.S....	Own..	S.G..	2	Wheel	52-12	S.G....	Rim..	Rev...	No...	.....	No.	No..	2	Roll...	Eagle H
Cir.Spl....	Pist...	Mod..	Pump.	7½	W..	Own...	Cone...	12	6⅜	900	Cone...	Own..	S.G..	....	Wheel	54-12	I.G....	Spokes	Rev...	No...	Plain..	No..	No..	2	Roll...	E-B AA
Cir.Spl....	Pist...	Perf...	Pump.	9	W..	Own...	Cone...	12	8	700	Cone...	Own..	S.G..	3	Wheel	60-12	I.G....	Spokes	Dead..	No...	Plain..	No..	No..	2	Roll...	E-B Q
Cir.Spl....	Pist...	Mod..	Pump.	10	W..	Own...	Cone...	16½	9	600	Cone...	Own..	S.G..	2	Wheel	72-16	I.G....	Spokes	Dead..	Yes..	Plain..	No..	No..	2	Roll...	E-B
Cir.Spl....	Pist...	Mod..	Pump.	.....	W..	Own...	E.S....	.....	.....	.....	.....	Own..	J.C....	1	Wheel	48-8½	S.G....	Axle..	Live..	Yes..	Roller	Yes.	Yes.	2	Roll...	Fageol
Cir.Spl....	Own..	Own..	Th-S...	12	W..	Own...	M.D.D.	9½	6½	1000	.....	Own..	J.C....	3	Wheel	42-12	Worm.	Axle..	Live..	No...	Roller	No..	No..	2	No F..	Fordson
Cir.Spl....	Pist...	Perf...	Pump.	7¾	W..	Own...	E.S....	13	7	900	.....	Nutt..	S.G..	2	Wheel	60-10	S.G....	Rim..	Rev...	No...	Plain..	No..	No..	2	Roll...	Frick
Hol.Crk...	Gear..	Perf...	Pump.	9¾	W..	Own...	E.S....	13	7	900	.....	Nutt..	S.G..	2	Wheel	60-12	S.G....	Rim..	Rev...	No...	Plain..	No..	No..	2	Roll...	Frick
Cir.Spl....	Gear..	S & J..	Pump..	10	W..	Own...	Cone...	11⅜	8⅛	1000	Cone...	Own..	S.G..	2	Drum	54-54	Chain..	Rim..	Rev...	No...	Plain..	No..	No..	2	Roll...	Gray
M.F.M.O.	Pist...	Mod..	Pump..	7¾	W..	Own...	C.B....	13	6½	800	C.B....	Own..	S.G..	2	Wheel	46-10	I.G....	Rim..	Rev...	No...	Plain..	No..	No..	2	Roll...	Hart-Parr 20
M.F.M.O.	Pist...	Mod..	Pump..	11	W..	Own...	C.B....	14	8¼	750	C.B....	Own..	S.G..	2	Wheel	52-10	I.G....	Rim..	Rev...	No...	Plain..	No..	No..	2	Roll...	Hart-Parr 30
M.F.M.O.	Pist...	Mod..	Pump.	11	W..	Own...	C.B....	14	8¼	750	C.B....	Own..	S.G..	2	Wheel	52-18	I.G....	Rim..	Rev...	No...	Plain..	No..	No..	2	Roll...	‡Hart-Parr.... (Road)
M.F.M.O.	Pist...	Mod..	Pump.	15	W..	Own...	C.B....	14	8½	750	C.B....	Own..	S.G..	2	Wheel	32-18	I.G....	Rim..	Rev...	No...	Plain..	No..	No..	2	Roll...	Hart-Parr 40
Cir.Spl....	Gear..	Perf...	Pump.	7	W..	Own...	F.D....	12	6	750	F.D....	Own..	Fric..	7	Wheel	54- 8	S.G....	Rim..	Rev...	No...	Plain..	No..	No..	2	Press..	Heider D
Cir.Spl....	Gear..	Perf...	Pump.	10	W..	Own...	F.D....	14	7	72⅞	F.D....	Own..	Fric..	7	Wheel	57-10	S.G....	Rim..	Rev...	No...	Plain..	No..	No..	2	Press..	Heider C
Cir.Spl....	Pist...	Perf...	Th-S...	10	W..	Own...	F.D....	8	5	750	F.D....	Own..	Fric..	7	Wheel	46- 6	Chain..	Rim..	Dead..	No...	Roller	Yes.	No..	2	Press..	Heider M-2
Cir.Spl....	Gear..	Perf...	Pump.	8	W..	Own...	E.S....	13	7	1000	E.S....	Own..	S.G..	2	Wheel	60-10	S.G....	Rim..	Rev...	No...	Plain..	No..	No..	2	Roll...	Huber (Light Four)
Hol.Crk...	Gear..	Perf...	Pump.	11½	W..	Own...	M.D.D.	13	7	1100	M.D.D.	Own..	S.G..	2	Wheel	60-10	S.G....	Rim..	Rev...	No...	Plain..	No..	No..	2	Roll...	Huber (Super 4)
M.F.M.O.	Pist...	Mod..	Pump.	8	W..	Own...	.....	.....	.....	.....	.....	Own..	Fric..	1	Wheel	48- 7	I.G....	Rim..	Dead..	Yes..	Plain..	No..	No..	2	Roll...	LaCrosse M
M.F.M.O.	Pist...	Mod..	Pump.	10	W..	Own...	C.B....	.....	.....	.....	C.B....	Own..	S.G..	1	Wheel	56-10	I.G....	Rim..	Rev...	Yes..	Roller	Yes.	No..	2	No F..	LaCrosse H
Hol.Crk...	Gear..	Perf...	Pump.	8	W..	T.Disc.	S.P....	15	....	680	S.P....	Own..	S.G..	2	Wheel	48-12	S.G....	Spokes	Rev...	No...	Roller	Yes.	No .	2	Roll...	Lauson S
Hol.Crk...	Gear..	Perf...	Pump.	12	W..	Own...	E.S....	16¾	....	500	E.S....	Own..	S.G..	2	Wheel	51-12	S.G....	Rim..	Rev...	No...	Roller	Yes.	No.	2	Roll...	Lauson T
Cir.Spl....	Ecc...	Perf...	Pump.	10	W..	Own...	E.S....	14	7	800	Fric....	Own..	S.G..	2	Wheel	50-12	I.G....	Spokes	Dead..	No...	Plain..	No..	No..	2	Roll...	Leader B
Hol.Crk...	Gear..	Own..	Pump.	15	W..	B&B...	S.P....	14	7¼	800	None...	Own..	S.G..	2	Wheel	52-12	I.G....	Rim..	Rev...	No...	Roller	No..	No..	2	Roll...	Leader N
Hol.Crk...	Gear..	Mod..	Pump.	10	W..	B&B...	S.P....	12	7	693	J.C....	Own..	S.G..	3	Track	-14	S.G....	.....	Dead..	No...	Roller	No..	No..	2	Roll...	Lincoln A
Cir.Spl....	Gear..	S-J...	Pump..	8	W..	Own...	Cone...	10	7	900	E.S....	Own..	S.G..	3	Wheel	54-14	S.&I.G.	Rim..	Dead..	No...	Roller	No..	No..	2	Roll...	Little Giant B
Cir Spl....	Gear..	S-J...	Pump..	12	W..	Own...	Cone...	9	13½	750	E.S....	Own..	S.G..	3	Wheel	66-20	S.&I.G.	Rim..	Dead..	No...	Roller	No..	No..	2	Roll...	Little Giant A
Hol.Crk...	Gear..	Special	Pump.	.....	W..	Own...	M.D.D.	.....	.....	.....	.....	Spec..	J.C....	3	Track	-12	Worm..	Axle..	.....	No...	Roller.	No..	No..	2	Roll...	Lombard
Hol.Crk...	Gear..	S-J...	Pump..	6	W..	Detl...	M.D.D	14	8	1000	.....	Foote.	S.G..	2	Wheel	48-12	I G....	.....	.....	.....	.....	.....	.....	2	Roll...	London
Cir.Spl....	Gear..	Own..	Th-S...	9	W..	Own...	M.D D.	15¼	7	645	M.D.D.	Own..	S.G..	3	Wheel	42-12	S.G....	Axle..	Live..	No...	Roller.	No..	No..	2	.....	McCormick-Deering
Cir.Spl....	Gear..	Own..	Th-S...	11	W..	Own...	M.D.D.	16¾	8	595	M.D.D.	Own..	S.G..	3	Wheel	50-12	S.G....	Axle..	Live..	No...	Roller.	No..	No..	2	.....	McCormick-Deering
M.F.M.O	.....	Mod..	Pump.	8¾	W..	Own...	E.S....	15	6½	750	E.S....	Own..	S.G..	2	Wheel	56-12	Spur..	Axle..	Live..	No...	Plain..	No..	No..	2	Roll...	Minneapolis
M.F.M.O	.....	Mod..	Pump.	8½	W..	Own...	M.D.D.	15½	7½	775	M.D.D.	Own..	S.G..	2	Wheel	54-12	Spur..	Axle..	Live..	No...	Plain..	No..	No..	2	Roll...	Minneapolis
M.F.M.O	.....	Mod..	Pump.	14	W..	Own...	M.D.D.	18½	10	700	E.S....	Own..	S.G..	2	Wheel	62-20	Spur..	Axle..	Live..	No...	Plain..	No..	No..	2	Roll...	Minneapolis
M.F.M.O	.....	Mod..	Pump.	60	W..	.....	C.B....	24	10½	550	E.S....	Own..	S.G..	2	Wheel	85-30	Spur..	Axle..	Live..	No...	Plain..	No..	No..	2	Roll...	Minneapolis
Hol.Crk...	Gear..	Mod..	Th-S...	6	W..	B&B...	S.P....	9	6½	1200	S.P....	Own..	S.G..	1	Wheel	52- 8	I.G....	Spokes	Dead..	Yes..	Roller	Yes.	No..	0	No F..	Moline (Universal D3)
Hol.Crk...	Gear..	Mod..	Th-S...	5	W..	B&B...	S.P....	9	6½	1200	S.P....	Own..	S.G..	1	Wheel	44- 8	I.G....	Spokes	Dead..	Yes..	Roller	Yes.	No..	0	No F..	Moline....(Orchard D)
Hol.Crk...	Gear..	Perf...	Pump..	12	W..	T.Disc.	S.P....	16	8½	650	Sp.....	Own..	S.G..	3	Track	66-12	Chain..	.....	.....	.....	Plain..	Yes.	No.	....	Roll...	‡Monarch C
Hol.Crk...	Gear..	Mod..	Pump..	13	W..	T.Disc.	S.P....	.....	.....	.....	.....	Own..	S.G..	3	Track	67-12	Chain..	.....	.....	.....	Plain..	Yes.	No.	....	Roll...	‡Monarch E
Hol.Crk...	Gear..	Mod..	Pump..	13	W..	T.Disc.	S.P....	.....	.....	.....	.....	Own..	S.G..	3	Track	89-12	Chain..	.....	.....	.....	Plain..	Yes.	No.	....	Roll...	‡Monarch D

Pom—Pomona
King—Kingston
Cir. Spl.—Circulating Splash
Hol. Crk.—Hollow Crank Shaft with Pressure and all Crankshaft Bearings
M. F. M. O.—Multi-Feed Mechanical Oiler
Pist—Piston
Ecc—Eccentric
McC—McCord

Perf—Perfex
Mod—Modine
McC—McCord
S-J—Shotwell-Johnson
Brem—Bremmer
Th-S—Thermo Siphon
W—Water
O—Oil

CLUTCHES:
B. & B.—Borg & Beck
Detl—Detlaff
T.-Disc—Twin-Disc
M. & E.—Merchant & Evans
S. P.—Single Plate
E. S.—Expanding Shoe
M. D. D.—Multiple Dry Disk
C. B.—Contracting Band
F. D.—Friction Drum
Fric—Friction
J. C.—Jaw Clutch
Spec—Special

TRANSMISSION:
Nutt—Nuttall
Full—Fuller
S. G.—Sliding Gear
J. C.—Jaw Clutch

TYPE:
FINAL DRIVE:
S. & I. G.—Spur and Internal Gear
Fric—Friction

I. G.—Internal Gear
S. G.—Spur Gear
SG.-BG.—Spur Gear and Bevel Gear
S. & W. G.—Spur and Worm Gear
Rev—Revolving
B.& R.—Ball and Roller
No F.—No Frame

Mechanical Specifications of 1924

MAKE AND MODEL	GENERAL: Price	Operator's Position	Type of Steering	Size Plow Recommended (Ins.)	Number Plows Recommended	Plowing or Cultivating Speed (M.P.H.)	Weight (Lbs.)	Ground Clearance (Ins.)	Drawbar Type	Drawbar—Belt Rating	ENGINE: Make	H. P. Rating (N.A.C.C.)	Normal R.P.M. at Plowing Speed	Number Cylinders	Bore and Stroke	Engine Type	Valve Arrangement	Governor: Make	Governor: Type	Ignition: Make	Fuel: Make and Size Carbureter (Ins.)	Fuel: Fuel Recommended
Aro.....F	$385	Rid.....	Wheel...	12"	1	2-3	1000	10	Non-A..	3-6...	Own....	8.10	900	1	4½x5	Ver...	"L"H...	Own .	Cent..	Bosch...	Scheb-1.	Gas...
Beeman .....(Junior)	195	Wal....	H-Bars..	None...	0	.....	190	14	Uni.....	½-1	B&S....	2.50	.....	1	2½x2½	Ver...	"L"H...	None..	None..	Own....	B&S-½	Gas...
Beeman.....K	265	Wal....	H-Bars..	7"	....	¾-3	550	7¾	Uni.....	1½-4	Own....	4.90	800	1	3½x4½	Ver...	"L"H...	None..	None..	Heinze..	King-¾	Gas...
Bolens.....	180	Wal....	H-Bars..	None...	0	.....	200	14	Hor.....	.....	B&S....	1.40	1200	1	2½x2½	Ver...	"L"H...	None..	None..	Own....	B&S-¾	Gas...
Centaur.....1924	345	R or W..	H-Bars..	9"-10"	1	1 -3	800	13	Uni.....	2½-5	New Way	8.10	900	1	4½x4½	Ver...	IH.....	N-W..	Cent..	Bosch...	Cart-1..	G-K..
Do-It-All .....(Jack)	395	R or W..	H-Bars..	9"	1	.....	750	15	Uni.....	2- 6	Own....	5.25	1500	1	3⅝x3⅞	Ver...	IH.....	Own..	Cent..	.....	.....	Gas...
Do-It-All .....(Baby)	495	R or W..	H-Bars..	10"	1	.....	1200	9	Uni.....	3- 6	Own....	8.10	700	1	4½x5	Ver...	"L"H...	None..	None..	Own....	Own-¾	K...
Do-It-All...(Twin Twelve)	495	R or W..	H-Bars..	10"-12"	1	.....	800	11	Uni.....	4-15	Own....	9.11	1500	2	3⅜x3⅞	Ver...	IH.....	None..	None..	Own....	.....	G-K..
Kinkade.....	190	Wal....	H-Bars..	5"	1	1½-2½	180	9	Uni.....	1½-3	Own....	3.80	1000	1	3 x3	Ver...	IH.....	None..	None..	Berling..	Scheb-½	Gas...
M. B. M.....Red E	250	Wal....	H-Bars..	6"	1	1 -4	410	7	.....	1-4½	Own....	5.50	1000	1	3¼x4	Ver...	IH.....	None..	None..	Bosch...	Holley-⅞	Gas...
Motor Macultivator.....	148	Wal....	H-Bars..	.....	0	.....	210	9	.....	1½-	Own....	.....	1000	1	2¾x3½	Ver...	"L"H...	None..	None..	Berling..	Scheb-¼	Gas...
N B.....2	375	R or W..	H-Bars..	9"	1	1½-3	750	10	Non-A..	-6	Own....	6.50	1500	2	2¾x4	Ver...	"L"H...	None..	None..	Simms..	King-¾	Gas...
Utilitor.....501	295	Wal....	H-Bars..	10"	1	2½	750	8	Uni.....	2¼-4	Own....	4.90	800	1	3½x4½	Ver...	"L"H...	Funk..	Cent..	Eise....	Holley-⅞	Gas...
Utilitor.....501-A	340	Rid.....	H-Bars..	10"	1	2½	9 5	8	Uni.....	2¼x4	Own....	4.90	800	1	3½x4½	Ver...	"L"H...	Funk..	Cent..	Eise....	Holley-⅞	Gas...

ABBREVIATIONS:

GENERAL:
Rid—Riding
Wal—Walking
R. or W.—Riding or Walking
H. Bars—Handle Bars

Non-A—Non-Adjustable
Hor—Horizontal
Uni—Universal
B. & S.—Briggs and Stratton

Ver—Vertical
"L" H—"L" Head
I. H.—In Head
Cent—Centrifugal
N-W.—New-Way

Eise—Eisemann
Scheb—Schebler
King—Kingston
Cart—Carter

Mechanical Specifications

MAKE AND MODEL	GENERAL: Price	Capacity: No. of 14" Plows	Plowing Speed (M.P.H.)	Wgt. Complete (Lbs.)	Wheel Base (Ins.)	Minimum Turning Diameter (Ft.)	Ground Clearance (Ins.)	Drawbar Type	Drawbar—Belt Rating	Steering Type	ENGINE: Make	Rated Horsepower (N.A.C.C.)	Number Cylinders	Bore and Stroke	Engine Type	No. of Cyls. per Casting	Valve Arrangement	Normal R.P.M. at Plowing Speed	Governor: Make	Governor: Type	Ignition: Make of System	Ignition: Impulse Starter Fitted?	Fuel System: Make and Size of Carbureter (Ins.)	Fuel System: Fuel Feed	Fuel System: Number and Capacity of Fuel Tanks (gals.)	Fuel System: Water Injected?	Fuel System: Make of Air Cleaner
Nichols-Shepard.....	2600	4-6	2.50	13500	102	.....	.....	Hor....	20-42	F.A.K..	Own..	51.20	2	8 x10	Hor..	1	IH....	450	Pick..	Cent.	Dixie..	Yes.	King 2...	Gra..	2-6G-23K....	Yes.	None.
Nichols-Shepard.....	3320	6-8	2.50	20500	111	.....	.....	Hor....	25-50	F.A.K..	Own..	39.20	2	9 x12	Hor..	1	IH....	375	Pick..	Cent.	Dixie..	Yes.	King 2½.	Gra..	2-6½G-40K..	Yes.	None.
Nichols-Shepard.....	4030	8-12	1.80	30000	135	.....	.....	Hor....	35-70	F.A.K..	Own..	.....	2	10 x14	Hor..	1	IH....	300	Pick..	Cent.	Dixie..	Yes.	King 3...	Gra..	2-8½G-40K..	Yes.	None.
Pioneer.....G	....	4	2.50	6500	89	24' 0"	14	Hor....	18-36	F.A.K..	Own..	48.40	4	5½x6	Hor..	2	"L"H.	750	Pierce.	Cent.	K-W..	Yes.	King 2...	Gra..	1-25G.....	Yes.	Ben...
Pioneer.....C	....	10	2.25	24000	156	40' 0"	24	Non.A..	40-75	F.A.K..	Own..	78.40	4	7 x8	Hor..	2	"L"H.	625	Own..	Cent.	K-W..	Yes.	King 2½.	Gra..	2-70G-30K...	Opt.	Ben...
Russell.....	....	3- 4	2.40	6000	96¼	29' 6"	13	Hor....	15-30	F.A.K..	Climax	40.00	4	5 x6½	Ver..	2	"L"H.	950	Climax	Cent.	Split..	Yes.	King 1½.	Gra..	2-3½G-21½K	Yes.	Ben...
Russell.....	....	4- 5	2.40	7900	109	33' 6"	13½	Hor....	20-40	F.A.K..	Climax	48.40	4	5½x7	Ver..	2	"L"H.	900	Climax	Cent.	Split..	Yes.	King 1½.	Gra..	2-5G-30K....	Yes.	Ben...
Russell.....	....	8-10	2.00	22550	149	38' 0"	15	Hor....	30-60	S.A....	Own..	102.40	4	8 x10	Ver..	1	"L"H.	525	Pick..	Cent.	Split..	Yes.	King 2...	Gra..	2-22G-88K...	Yes.	Ben...
‡Shaw-Enochs (Grader)	....	....	....	4400	153½	....	....	Uni....	.....	S.A....	LeRoi.	15.63	4	3½x4½	Ver..	4	"L"H.	1200	LeRoi.	Cent.	Eise....	No..	Scheb 1..	Gra..	1-20G.....	No..	United
Stinson.....	1635	3- 4	3.00	7100	114	12' 0"	....	Ver....	18-36	F.A.K..	Beav..	36.10	4	4¾x6	Ver..	4	IH....	1000	Taco..	Cent.	Dixie..	Yes.	King 1⅜.	Gra..	2-6G-26K....	No..	Rains.
Titan.....	....	3	2.75	5710	91	14' 0"	....	Uni....	10-20	F.A.K..	Own..	37.80	2	6½x8	Hor..	2	IH....	575	Own..	Cent.	Eise....	Yes.	Ensign...	Pres..	1-16K.....	Yes.	Own..
‡Topp-Stewart.....	3500	6	2.50	7800	100	12' 0"	12	Hor....	30-45	S.A....	Wauk.	36.10	4	4¾x6¾	Ver..	2	"L"H.	950	Wauk.	Cent.	Eise....	Yes.	Strom 1½	Gra..	1-25G.....	No..	Ben...
Toro.....	675	2	2.75	2900	72	11' 0"	10½	Uni....	6-10	F.A.K..	LeRoi.	15.63	4	3½x4½	Ver..	4	"L"H.	1200	Own..	Cent.	Eise....	No..	King 1...	Gra..	1-15G.....	No..	Own..
Townsend.....	800	2- 3	2.50	4500	78	20' 0"	16	Hor....	10-20	F.A.K..	Own..	33.80	2	6½x7	Hor..	2	IH....	550	Own..	Cent.	Split..	Yes.	Own 1½..	Pres..	1-14K.....	Yes.	Opt...
Townsend.....	1350	3- 4	2.50	6500	86	24' 0"	17	Hor....	15-30	F.A.K..	Own..	39.20	2	7 x8	Hor..	2	IH....	500	Own..	Cent.	Split..	Yes.	Own 2....	Pres..	1-18K.....	Yes.	Opt...
Townsend.....	2250	4- 8	2.50	11500	102	30' 0"	18	Hor....	25-50	F.A.K..	Own..	57.80	2	8½x10	Hor..	2	IH....	475	Own..	Cent.	Split..	Yes.	Own 2½..	Pres..	1-30K.....	Yes.	Opt...
Traylor.....	500	1	2.25	1750	76	20' 0"	16	Hor....	6-12	F.A.K..	LeRoi.	15.63	4	3½x4½	Ver..	4	"L"H.	1000	LeRoi.	Cent.	Split..	Yes.	King 1...	Gra..	1-10G.....	No	Orem.
Twin City.....	1200	3	2.90	4700	84	12' 6"	10	Hor....	12-20	F.A.K..	Own..	28.90	4	4¼x6	Ver..	4	IH....	1000	Own..	Cent.	Bosch.	Yes.	Holley1¼	Gra..	2-1½G-23K..	No..	Don..
Twin City.....	2750	5	2.90	8400	97	15' 0"	13	Hor....	20-35	F.A.K..	Own..	48.40	4	5½x6¾	Ver..	4	IH....	900	Own..	Cent.	Bosch.	Yes.	Holley 2..	Gra..	2-1½G-40K..	No..	Ben...
Twin City.....	4750	8	2.00	23700	144	42' 0"	16	Hor....	40-65	F.A.K..	Own	96.10	4	7¾x9	Ver..	1	IH....	535	Own..	Cent.	Bosch.	Yes.	Strom 2..	Gra..	2-10G-95K...	Yes.	None.
Uncle Sam.....C-20	....	2- 3	3.50	3000	72	12' 0"	10	Hor....	12-20	F.A.K..	Hor....	25.60	4	4 x5	Ver..	4	IH....	1200	Duplex	Suct.	Dixie..	Yes.	King 1¼.	Gra..	1-20G.....	No..	Ben...
Uncle Sam.....B-19	....	3- 4	3.75	4650	85	13' 0"	14	Hor....	20-30	F.A.K..	Beav..	36.10	4	4¾x6	Ver..	4	IH....	1000	Duplex	Cent.	Dixie..	Yes.	Ben. 1½..	Gra..	2-5G-22K...	No..	Ben...
Uncle Sam.....D-21	....	3- 4	3.75	4600	85	13' 0"	14	Hor....	20-30	F.A.K..	Beav..	36.10	4	4¾x6	Ver..	4	IH....	1000	Duplex	Cent.	Dixie .	Yes.	Ben. 1½..	Gra..	2-5G-22K...	No..	Ben...
Wallis.....OK	....	3	3.50	3660	84	20' 0"	13	Uni....	15-27	F.A.K..	Own..	28.90	4	4¼x5¾	Ver..	4	IH....	900	Own..	Hyd.	Bosch.	Yes.	Ben. 1¼..	Gra..	1-20G&K....	No..	Own..
Waterloo Boy.....N	....	3	3 00	5869	89	14' 0"	13	Hor....	12-25	F.A.K..	Own..	33.80	2	6½x7	Hor..	2	IH....	750	Own	Cent.	Split..	Yes.	Scheb 1½	Gra..	2-1G-20K....	Yes.	Own..
Wetmore.....	1185	3	3.50	2900	72	15' 0"	12½	Hor....	12-25	F.A.K..	Wauk.	25.60	4	4 x5¾	Ver..	2	"L"H.	1050	Wauk.	Cent.	Split..	Yes.	Scheb 1¼	Gra..	2-2½G-12K..	No..	None.
Wisconsin.....	1750	3- 4	3.50	5600	90	11' 0"	16	Hor....	16-30	F.A.K..	Climax	40.00	4	5 x6½	Ver..	2	"L"H.	800	Climax	Cent.	Eise....	Yes.	Strom 1½	Gra..	2-6G-20K....	No..	R-W..
Wisconsin.....	2550	4- 5	3.50	7500	.....	12' 0"	15	Hor....	22-40	F.A.K..	Climax	48.40	4	5½x7	Ver..	2	"L"H.	800	Climax	Cent.	Eise....	Yes.	Strom 1½	Gra..	2-6G-25K....	No .	R-W..
Yuba.....(Ball Tread)	2750	4	2.25	5750	.....	15' 0"	10	Hor....	15-25	S.A....	Wis...	28.90	4	4¼x6	Ver .	4	"L"H.	900	Own..	Cent.	Bosch.	Yes.	Strom 1¼	Gra..	2-4G-21K....	No..	Pom..
Yuba.....(Ball Tread)	4500	8	2.08	10130	.....	16' 6"	11⅝	Uni....	25-40	S.A....	Own..	52.90	4	5¾x7	Ver..	2	IH....	800	Own..	Cent.	Bosch.	Yes.	Strom 1¼	Gra..	2-8G-38K....	.....	Pom..

The buyers' guide to tractors has been omitted from this issue of MOTOR AGE inasmuch as it is difficult at the present time to obtain prices from the tractor manufacturers.

Regarding the mechanical specifications of agricultural tractors there are several things which stand out prominently as differing from the general practice in the passenger car field. In the matter of ignition, for instance, the magneto is almost universal. This is naturally so because it eliminates the storage battery, an item of considerable moment on a farm vehicle. There is no necessity for lights on a tractor, hence a battery naturally can be dispensed with. Most of the tractor makers furnish an impulse starter which aids materially in starting the engine.

Agricultural Tractors—Continued

ENGINE								CLUTCH			BELT PULLEY			TRANSMISSION										MAKE AND MODEL
System		Oiling System		Cooling System																				
Number and Capacity of Fuel Tanks (gals.)	Make of Air Cleaner	Type of System	Type of Pump	Cooled By	Make of Radiator	Circulation By	Capacity of System	Make	Type	Control	Make of Clutch	R.P.M.	Diameter and Face (ins.)	Type	No. Forward Speeds	Drive from Engine or Gearset to Driving Wheels	Final Drive	No. Driving Wheels	Diameter and Face Driving Wheels (ins.)	Type Drive Wheel Axle Bearings	No. Non-Drive Wheels	Frame Type	
1-2½G..	Don..	Cir-Spl.	Gear...	Water.	Sh-John.	Ther-S..	2	Own....	E.B....	H-Lever...	Own..	900	6 -4½	.....	1	Worm.	Axle..	2	30-4	Roller.	0	None..	Aro.....F
1- ½G..	Don..	Cir-Spl.	Piston..	Air...	None....	Fan.....	0	Own....	Special	H-Lever...	None..	.....	.....	Direct.	1	Chain.	Spokes	2	16-3	Plain..	0	None..	Beeman.....(Junior)
1-1¼G..	Don..	Cir-Spl.	None..	Water.	Sh-John	Ther-S..	0	Own....	Cone...	H.B.Grip..	None..	800	3½-4½	Direct.	1	Sp.G.	Rim..	2	25-3¼	Plain..	2	None..	Beeman.....K
1- ½G..	Don..	Cir-Spl.	Piston..	Air...	None...	Fan.....	0	Own.....	.....	.....	.....	.....	6 -2	250	1	Chain.	.....	2	16-3	Dead..	2	Steel..	Bolens.....
1-2½G..	Own..	Splash..	None...	Air...	None....	Fan.....	0	New Way	MDD..	H-Lever...	None..	900	4 -6	S.G...	1	Chain.	Axle..	2	28-4	Roller.	0	Rolled..	Centaur.....1924
1-5G....	None..	Cir-Spl.	.....	Air...	None...	Fan.....	0	Own....	.....	H.B.Grip..	None..	1500	3 -3	J.C....	.....	.....	.....	2	.....	Roller.	0	.....	Do-It-All.....(Jack)
1-1K....	None..	Cir-Spl.	.....	Water.	.....	.....	.....	Own....	Jaw....	H.B.Grip..	None..	1800	2 -2	J.C....	.....	.....	Axle..	2	26-2½	.....	0	.....	Do-It-All.....(Baby)
1-5G....	None..	Cir-Spl.	Gear...	Air...	None....	Fan.....	0	Own....	Jaw....	H.B.Grip..	None..	1500	4 -4	S.G....	.....	.....	Axle..	2	32-4	Roller.	2	None..	Do-It-All...(Twin Twelve)
2-1G-¼O	Own..	Cir-Spl.	Ecc....	Air...	None....	Fan.....	0	Own....	Jaw....	H.B.Grip..	None..	1000	3 -3	JC....	1	IG....	Spokes	1	22-5¼	Plain..	2	Pressed.	Kinkade.....
1-2G....	Own..	Spec...	None.	Air...	None...	Fan	0	.....	.....	H-Lever..	None..	.....	3 -3½	JC....	1	Worm.	Axle..	2	20-3	Plain..	2	None..	M. B. M.....Red E
1-1G....	None.	NCS..	Gear...	Air...	None...	Fan	0	Own....	Cone..	H.B.Grip.	None..	.....	.....	.....	.....	SG....	Spokes	2	19½-3	Plain..	0	None..	Motor Macultivator.....
2-2G-¼O	Ben..	Cir-Spl.	.....	Water.	G&O....	Ther-S..	3	Own....	.....	H-Lever...	None..	2800	5½-4¼	Plan..	1	IG....	Rim..	2	32-4	Plain..	2	None..	N B.....2
2-1½G-¼O	Own..	Cir-Spl.	Gear...	Water.	Fedders.	Ther-S..	1½	Own....	Cone...	H.B.Grip.	None..	1200	4⅝-3¾	Direct.	1	IG....	.....	2	24¾-4	Plain..	2	.....	Utilitor.....501
2-1½G-¼O	Own..	Cir-Spl	Gear...	Water.	Fedders.	Ther-S..	1½	Own....	Cone...	H-Lever..	None..	1200	4⅝-3¾	Direct.	1	IG....	.....	2	24¾-4	Plain..	2	.....	Utilitor.....501-A

Gas—Gasoline
K—Kerosene
G-K—Gasoline or Kerosene
Don—Donaldson
Ben—Bennett

Cir. Spl.—Circulating Splash
Ecc—Eccentric
Sh.-John—Shotwell-Johnson
Ther-S.—Thermo-Siphon
NCS—Non-Circulating Splash

Spec—Special
E. B.—Expanding Band
M. D. D.—Multiple Dry Disk
H. Lever—Hand Lever
H. B. Grip—Handle Bar Grip

TRANSMISSION:
S. G.—Sliding Gear
J. C.—Jaw Clutch

Plan—Planetary
Sp. G.—Spur Gear
IG—Internal Gear

of 1924 Garden Tractors

ENGINE						CLUTCH		BELT PULLEY			TRANSMISSION													MAKE AND MODEL
Oiling System		Cooling System																						
Type of System	Type of Pump	Make of Radiator	Circulation by	Capacity of System (Gals.)	Fluid	Make	Type	Diameter (Ins.)	Face (Ins.)	Normal R.P.M.	Clutch Type	Make	Type	Number of Forward Speeds	Final Drive	Diameter and Face Traction Members (Ins.)	Drive from Gearset to Traction Members	Drive Taken Through	Drive Wheel Axle Type	Does Differential Lock?	Type Drive Shaft Axle Bearings	Individual Brakes for Steering?	Individual Clutches for Steering?	Number of Non-Drive Wheels	Frame Type	
M.F.M.O	Ecc...	Perf...	Pump..	23	W..	Own...	C.B...	22	8	450	E.S....	Own..	J.C..	2	Wheel.	64-20	I.G....	Rim..	Live..	No...	Plain..	No..	No..	2	Roll...	Nichols-Shepard.....
M.F.M.O	Ecc...	Perf...	Pump..	40	W..	Own...	C.B...	24	9	375	E.S....	Own..	J.C...	1	Wheel.	69-28	S.G....	Rim..	Live..	No...	Plain..	No..	No..	2	Roll...	Nichols-Shepard.....
M.F.M.O	Ecc...	Perf...	Pump..	40	W..	Own...	E.S....	30	12	300	E.S....	Own..	J.C..	1	Wheel.	73-32	S.G....	Rim..	Live..	No...	Plain..	No..	No..	2	Roll...	Nichols-Shepard.....
M.F.M.O	Gear..	S-J...	Pump..	20	W..	Own...	M.D.D.	14	7	725	M.D.D.	Own..	S.G..	3	Wheel.	60-18	S.G....	Spokes	Rev...	No...	Roller	No..	No..	2	Roll...	Pioneer.....G
M.F.M.O	Gear..	S-J...	Pump..	35	W..	Own...	M.D.D.	17½	15	625	M.D.D.	Own..	S.G..	3	Wheel.	96-24	S.G....	Spokes	Rev...	No...	Plain..	Yes.	No..	2	Roll...	Pioneer.....C
Hol.Crk...	Vane..	Mod..	Pump..	8	W..	Own...	E.S....	12½	7	833	None...	Own..	S.G..	2	Wheel.	56-14	S.G....	Rim..	Dead..	No...	Roller.	No..	No..	2	Roll...	Russell.....
Hol.Crk...	Vane..	Mod..	Pump..	9½	W..	Own...	E.S....	12½	8	835	None...	Own..	S.G..	2	Wheel.	60-16	S.G....	Rim..	Dead..	No...	Roller.	No..	No..	2	Roll...	Russell.....
M.F.M.O	Gear..	Mod..	Pump..	26	W..	Own...	E.S....	24	10	525	E.S....	Own..	S.G..	2	Wheel.	84-22	S.G....	Rim..	Dead..	No..	Plain.	No..	No..	2	Roll...	Russell.....
Cir.Spl....	Ecc...	S-J...	Th-S...	7	W..	B&B...	S.P....	.....	.....	.....	None...	Own..	S.G..	2	Wheel.	48- 8	Worm..	Axle..	Live..	No...	B&R..	No..	No..	0	No. F.	‡Shaw-Enochs (Grader)
Hol.Crk...	Gear..	Todd..	Pump..	10	W..	Own...	C.B....	12	8	1000	C.B....	Own..	S.G.	1	Wheel.	60-12	S.G....	Axle..	Live..	No...	Plain..	No..	No..	2	No. F.	Stinson.....
M.F.M.O	Pist..	Own..	.....	40	W..	Own...	F.D....	18	8½	575	F.D....	Own..	S.G..	2	Wheel.	54-10	Chain..	Spokes	Dead..	Yes..	Roller.	No..	No..	2	Roll...	Titan.....
Cir.Spl....	Gear..	Brem.	Pump..	12	W..	Hill....	M.D.D.	Opt.	.....	.....	Opt....	Own..	S.G..	3	Wheel.	42-12	S.&I.G.	Rim..	Live..	No...	Roller.	No..	No..	0	Roll...	‡Topp-Stewart.....
Cir.Spl....	Pist..	S-J...	Th-S...	3	W..	Own...	C.B....	8	5	1200	None...	Own..	S.G..	2	Wheel.	41- 9	S.G....	Spokes	Dead..	Yes..	Roller.	Yes.	No..	2	No. F.	Toro.....
M.F.M.O	Pist..	Own..	Pump..	50	W..	Own...	Spec...	18	7	550	Spec...	Own..	S.G..	1	Wheel.	48-12	S.G....	Rim..	Live..	No...	Plain..	No..	No..	2	Roll...	Townsend.....
M.F.M.O	Pist..	Own..	Pump..	75	W..	Own...	Spec...	20	8	500	Spec...	Own..	S.G..	1	Wheel.	56-18	S.G....	Rim..	Live..	No...	Plain..	No..	No..	2	Roll...	Townsend.....
M.F.M.O	Pist..	Own..	Pump..	100	W..	Own...	Spec...	22	10	475	Spec...	Own..	S.G..	1	Wheel.	60-24	S.G....	Axle..	Live..	No...	Plain..	No..	No..	2	Roll...	Townsend.....
Hol.Crk...	Pist..	G&O..	Th-S...	4	W..	B&B...	S.P....	8	6	1000	None...	Own..	S.G..	1	Wheel.	38-10	I.G....	Rim..	Dead..	No...	Plain..	Yes.	No..	2	Roll...	Traylor.....
Hol.Crk...	Gear..	Mod..	Pump..	10½	W..	T.Disc.	S.P....	16	6½	650	None...	Own..	S.G..	2	Wheel	50-12	S.G....	Axle..	Live..	No...	Roller.	No..	No..	2	No. F.	Twin City.....
Hol.Crk...	Gear..	Mod..	Pump..	18	W..	T.Disc.	S.P....	21	8½	466	None...	Own..	S.G..	2	Wheel.	60-20	S.G....	Axle..	Live..	No...	Roller.	No..	No..	2	No. F.	Twin City.....
M.F.M.O	Plung.	Own..	Pump..	130	W..	Own...	C.B....	23	10½	535	C.B....	Own..	J.C..	1	Wheel.	84-24	S.G....	Rim..	Rev...	No...	Plain..	No..	No..	2	Roll...	Twin City.....
Hol.Crk...	Gear..	Perf...	Pump..	.....	W..	B&B...	S.P....	16	6	1000	None...	Own..	Chain	2	Wheel.	46-12	Chain..	Axle..	Live..	No...	Roller.	No..	No..	2	Roll...	Uncle Sam.....C-20
Hol.Crk...	Gear..	Perf...	Pump..	.....	W..	T.Disc.	S.P....	11	9¼	1000	J.C....	Nutt..	S.G..	2	Wheel.	50-12	S.G....	Axle..	Live..	No...	Roller.	No..	No..	2	Roll...	Uncle Sam.....B-19
Hol.Crk...	Gear..	Perf...	Pump..	.....	W..	T.Disc.	S.P....	11	9¼	1000	J.C....	Nutt..	S.G..	2	Wheel.	50-12	S.G....	Axle..	Live..	No...	Roller.	No..	No..	2	Press..	Uncle Sam.....D-21
Cir.Spl....	Pist..	Mod..	Pump..	5¼	W..	T.Disc.	S.P....	18½	7	475	T.Disc.	3.P....	S.G..	2	Wheel.	48-12	S.G....	Axle..	Live..	No...	Roller.	No..	No..	2	Roll...	Wallis.....OK
Cir.Spl....	Pist..	Mod..	Pump..	13	W..	Own...	C.B....	14	8	750	C.B....	Own..	S.G..	2	Wheel.	52-12	I.G....	Rim..	Rev...	No...	Roller.	No..	No..	2	Press..	Waterloo Boy.....N
Hol.Crk...	Gear..	Ideal..	Pump..	7½	W..	Fuller..	M.D.D.	12	7	750	None...	Full...	S.G..	3	Wheel.	46-10	I.G....	Spokes	Dead..	No...	Roller.	No..	No..	2	Roll...	Wetmore.....
Hol.Crk...	Ecc...	Perf...	Pump..	14	W..	T.Disc.	Plate...	16	8	575	Plate...	Foote.	S.G..	2	Wheel.	52-12	S.G....	Rim..	Rev...	No...	Plain..	No..	No..	2	Roll...	Wisconsin.....
Hol.Crk...	Ecc...	Perf...	Pump..	16	W..	T.Disc.	Plate...	16	9	375	Plate...	Foote.	S.G..	2	Wheel.	52-12	S.G....	Rim..	Rev...	No...	Plain..	No..	No..	2	Roll...	Wisconsin.....
Hol.Crk...	Gear..	Mod..	Pump..	5½	W..	Parag..	M.D.O.	12	6½	900	S.P....	Own..	S.G..	2	Track.	-12	S.G....	.....	.....	.....	Roller.	No..	Yes.	1	Roll...	Yuba.....(Ball Tread)
Cir Spl....	Gear..	Mod .	Pump..	20	W..	Parag..	M.D.O.	14	8½	800	S.P....	Own..	S.G..	2	Track.	-17½	S.G....	.....	.....	.....	Roller.	No..	Yes.	1	Roll...	Yuba.....(Ball Tread)

The tractor makers are about divided half and half when it comes to water injection into the combustion chambers to assist in carburetion. Of course where kerosene is used for fuel the makers for the most part have adopted the water injection system.

Air cleaners which to-day are being given much thought by the passenger car makers and, in fact, used as standard equipment on several cars are common to nearly every tractor. They have been used for years on tractors because of the dust in which the machines operate.

Mechanical Specifications of

This table comprises Motor Bus Chassis which are

For other chassis which are recommended and adapted for Bus use, see models

MAKE AND MODEL	GENERAL							ENGINE						ELECTRICAL SYSTEM						GOVERNOR		TRANS-	
						Tires, Type and Size							Fuel System	Ignition System				Battery				Clutch	
	Passenger Rating	Price	Standard Wheelbase (Ins.)	Tread, Front and Rear (Ins.)	Chassis Weight (Lbs.)	Front (Ins.)	Rear (Ins.)	Make and Model	Number of Cylinders, Bore and Stroke (Ins.)	Rated Horse Power (N.A.C.C.)	Valve Arrangement	Oiling System	Carbureter Make	Fuel Feed	Make	Current Source	Generator and Starter Make	Maximum Capacity of Generator (Watts)	Make	Voltage and Amp. Hour Capacity	Type	Maximum Governed Speed (M.P.H.)	Make	Type
Acme.....K	30	.....	200	58½-74	7200	P-36x6	P-36x6d	Cont.....6B	6-3¾x5	33.7	L...	Fl Pr..	Zen...	V..	Eis...	M..	Rem a...	240	Wil...	6-111	N P...	35	B & B.	S P....
Ameco.....C	36	.....	213½	64½-76	9000	P-32x6	P-32x6	WSM....102	4-4¾x6	36.1	I...	Fl Pr..	Str....	V..	Spl...	B..	L-N.....	.....	Sta...	12-180	Ce....	35	Ful...	MDD.
Bridgeport.....45	30	$3850	178	60 -72	5500	P-36x6	P-36x6d	Bud....EBU	4-4¼x5½	28.9	L...	Pr Cs.	Zen...	V..	Eis...	M..	Bos.....	Opt.	Wil...	6-120	N P..	N P..	B-L...	MDD.
Brockway.....EB	20	.....	156	56 -56	3200	P-30x5	P-32x6	Wis.....SU	4-4 x5	25.6	I...	Pr Cs.	Zen...	V..	Eis...	M..	L-N.....	112	Exi...	6-105	N P..	N P..	B-L...	MDD.
Brockway.....J3	25	.....	185	66½-71	8000	P-36x6	P-36x6d	Cont.....6B	6-3¾x5	33.7	L...	Fl Pr..	Zen...	V..	Spl...	M..	L-N.....	....	Exi...	12-220	N P..	N P..	B-L...	MDD.
Chicago Bus (See 36)																								
Day-Elder.....20	20	.....	168	56 -58	5200	P-36x6	P-38x7	Cont.....K4	4-4⅛x5¼	27.2	L...	Fl Pr..	Zen...	V..	Eis...	M..	Bos.....	75	Wil...	6-153	Su....	35	B-L...	MDD.
Day-Elder.....25	25	.....	180	58 -58½	5600	P-36x6	P-40x8	Bud....EBU	4-4¼x5½	28.9	L...	Pr Cs.	Zen...	V..	Eis...	M..	Bos.....	75	Wil...	6-153	Su....	35	B-L...	MDD.
Day-Elder.....30	30	.....	192	68½-74	6000	P-36x6	P-36x6d	Bud....YBU	4-4½x6	23.4	L...	Pr Cs.	Zen...	V..	Eis...	M..	Bos.....	75	Wil...	6-153	Su....	35	B-L...	MDD.
†Duplex.....AB	23	.....	160	56 -62	4400	P-35x5	P-38x7	HinkHAA400	4-4 x5¼	25.6	L...	Pr Cs.	Str....	V..	Wes...	B..	Wes.....	....	Pre...	6-34	N P..	N P..	B-L...	MDD.
Fageol.....22	22	5375	218	70 -71	.....	P-36x6	P-38x7	HaS.....50	4-4¼x5½	28.9	I...	Pr Cs.	Zen...	V..	Del...	B..	Del.....	12	Exi...	12-	Ce....	41	B-L...	MDD.
Fageol.....22	22	5825	230	70 -78¼	.....	P-38x7	P-36x6d	HaS.....75	6-4¼x5½	43.0	I...	Pr Cs.	Zen...	V.	Del...	B..	Del.....	....	Exi...	12-	Ce....	41	B-L...	MDD.
Fifth Ave. Coach....J	29	6900	172	68¼-71¼	5660	C*-34x5	C*-34x7d	Yell.....EZ	4-4 x6	25.6	Sl...	Pr Cs.	Zen...	V..	Eis...	M..	§§N-E..	300	Wil...	12-90	N P..	N P..	Own..	SP....
Fifth Ave. Coach....L	51	8800	174¾	67 -77½	6670	S-36x5	S-36x5d	Yell.....EZ	4-4 x6	25.6	Sl...	Pr Cs.	Zen...	G..	Eis...	M..	§§N-E..	300	Wil...	12-90	N P..	N P..	Own..	SP....
Garford.....726	25	.....	168	56 -65½	4800	P-32x6	P-32x6d	Bud....EBU	4-4¼x5½	28.9	L...	Pr Cs.	Str....	G..	Spl...	M..	A-K.....	.....	Exi...	.....	Opt...	Opt...	Own..	MDD.
Garford.....51D	29	.....	187	68 -75¾	6500	P-36x6	P-36x6d	Bud....YBU	4-4½x6	23.4	L...	Pr Cs.	Str....	V..	Spl...	M..	Rem b...	.....	Wil...	6-190	Opt...	Opt...	Own..	MDD.
Guilder.....30	30	4250	191	64 -70	5600	P-36x6	P-36x6d	Bud....EBU	4-4¼x5½	28.9	L...	Pr Cs.	Zen...	V.	Eis...	M..	L-N.....	.....	Wil...	12-	.....	30	B-L...	MDD.
†Gary.....FB	21	.....	154	56 -56	3680	P-35x5	P-36x6	Bud....GBU	4-4 x5¼	25.6	L...	Pr Cs.	Zen...	V.	Eis...	M..	Ves c...	.....	Ves...	6-93	Su....	26	Ful...	MDD.
†Gary.....Bil	25	.....	175	58 -58	4450	P-35x5	P-38x7	Bud....EBU	4-4¼x5½	28.9	L...	Pr Cs.	Zen...	V.	Eis...	M..	Ves. c...	.....	Ves...	6-93	Su....	25	Ful...	MDD.
International.....33	18	.....	150	56 -56½	.....	C*-36x4	S*-36x6	Own.....	4-3¾x5	22.5	I...	Spla..	Own..	G..	Bos...	M..	‡‡Rem..	175	Pre...	6-100	Ce....	19	Own..	MDD.
International.....53	29	.....	190	64½-65	.....	P-36x6	P-36x6d	Own.....	4-4¼x5	28.9	I...	Spla..	Own..	V..	Bos...	M..	Rem.....	175	Pre...	6-200	Ce....	34	Own..	MDD.
Kissell.....	18	5200	202	64½-66	.....	P-34x7	P-34x7d	Own.....	4-4¼x5½	28.9	L...	.....	Str....	V..	Bos...	....	Rem.....	....	Wil...	6-153	.....	.....	B-L...	.....
Mack.....AB	25	4720	194½	58¼-60¼	5370	P*-32x6	P*-32x6d	Own.....	4-4¼x5	28.9	L...	Sp Pr	Zen...	V..	Spl...	M..	L-N.....	.....	Exi...	12-120	N P..	N P..	Own..	MDD.
Master.....DDB	30	.....	194	59 -59	6000	S-36x6	S-40x8	Bud....EBU	4-4¼x5½	28.9	L...	Pr Cs.	Zen...	V.	Eis...	M..	Wes.....	.....	Wil...	12-	.....	25	Ful...	MDD.
Menominee.....T	16	2600	175	56 -56	3850	P-32x6	P-32x6d	Wisc.....Y	6-3⅝x5	.....	.....	.....	Zen...	V.	Bos...	M..	Bos.....	.....	Wil...	6-	N P..	38	Del...	MDD.
Menominee.....DB	25	4400	186	68 -73	5900	P-36x6	P-36x6d	Wisc.....TAU	4-4 x6	25.6	L...	Pr Cs.	Str....	V.	Eis...	M..	Bos.....	.....	Wil...	6-	Su....	32	Del...	MDD.
Moreland.....RC	12	2280	180	56 -56	.....	P-32x6	P-32x6	Herc.....0	4-4 x5	25.6	L...	Pr Cs.	Zen...	V.	Spl...	M..	A-L.....	85	Hob...	6-140	Ce....	.....	B-L...	MDD.
Moreland.....EC	20	3780	178	61 -60	4590	P-34x5	P-34x5d	Cont.....K4	4-4½x5¼	27.2	L...	Fl Pr..	Str....	V.	Spl...	M..	A-L.....	150	Hob...	6-140	Ce....	.....	B-L...	MDD.
Moreland.....AC	25	4700	.....	.....	5660	P-36x6	P-36x6d	Cont.....L4	4-4½x5½	32.4	L...	Fl Pr..	Str....	V.	Spl...	M..	A-L.....	150	Hob...	6-140	Ce....	.....	B-L...	MDD.
Parker.....E24B	16	2400	150	55 -58	3700	P-32x6	P-32x6	Wisc.....SU	4-4 x5	25.6	I...	Pr Cs.	Str....	V.	Wes...	B..	Wes.....	90	Glo...	6-80	Ce....	40	Ful...	MDD.
Phila. Motor Coach..P	65	6500	216	64½-75	8750	S-34x6	S-34x6d	Own.....	6-4 x6	38.4	I...	Pr Cs.	Zen...	V.	N-E...	B..	N-E.....	....	Exi...	12-180	.....	25	B-L...	MDD.
Selden.....52	30	.....	195	68 -74	7200	S*-36x5	S*-36x5d	Cont.....L4	4-4½x5½	32.4	L...	Fl Pr..	Str....	V.	Bos...	M..	N-E.....	250	Pre...	12-	Ce....	.....	B-L...	MDD.
Sterling.....GB1	21	4050	156	56 -58	4800	P-35x5	P-35x5d	Wauk....FU	4-4 x5¾	25.6	L...	Pr Cs.	Zen...	V.	Eis...	M..	Bos.....	.....	Gou...	6-132	Ce....	27	B-L...	MDD.
Sterling.....GB2	29	4575	174	60¼-58½	5700	P-36x6	P-36x6d	Wauk....CU	4-4⅜x5¾	30.6	L...	Pr Cs.	Zen...	V.	Eis...	M..	Bos.....	.....	Gou...	6-132	Ce....	28	B-L...	MDD.
Ultimate.....BU	30	5600	198	66½-69	.....	P-36x6	P-36x6d	Bud....YBU	4-4½x6	23.4	L...	Pr Cs.	Str....	V.	Eis...	M..	N-E.....	....	Wes...	12-378	Opt...	Opt...	B-L...	MDD.
White.....50A	25	.....	198	58½-67½	5400	P-36x6	P-36x6d	Own.....	4-4¼x5¾	28.9	L...	Pr Cs.	Zen...	V.	.....	M..	L-N.....	.....	Opt...	12-	Ce....	.....	Own..	SP....
Wisconsin.....BA	25	6500	218	68 -68	5500	P-32x6	P-34x7	Cont.....6B	6-3¾x5	33.7	L...	Fl Pr..	Str....	V.	Del...	M..	Del.....	.....	Exi...	6-	N P..	N P..	B-L...	MDD.
Wisconsin....6-Wheel	28	8500	216	68 -68	6000	P-32x6	P-32x6	Cont.....6B	6-3¾x5	33.7	L...	Fl Pr..	Str....	V.	Del...	B..	Del.....	....	Exi...	6-	N P..	N P..	B-L...	MDD.
Yellow Coach.....Z	67	.....	192	71 -73½	.....	S*-34x5	S*-34x5d	R & V.....	4-4 x6	25.6	Sl...	Pr Cs.	Zen...	V.	.....	M..	.....	300	.....	.....	.....	.....	Own..	SP....

ABBREVIATIONS:

*—Pneumatics optional at extra cost
‡—Also Fabric Joint
†—1923
§—Price with body
§§—Generator Only
‡‡—Optional at extra cost
a—Delco
A-L—Auto-Lite
AT—Attached
Atl—Atlas
b—Atwater-Kent
B—Battery
B&B—Borg & Beck
B-L—Brown-Lipe
Blo—Blood
Bos—Bosch
Bud—Budd
c—Westinghouse
C—Cushion
C&L—Cam & Lever
Ce—Centrifugal
Cla—Clark
Col—Columbia
Con—Continental Axle
Cont—Continental
Cot—Cotta
d—Dual
D-A—Disk Aluminum
D-C—Disk Cast Steel
D-P—Disk Pressed Steel
Day—Dayton
Del—Delco
Del—Detlaff
DR—Double Reduction
E—Free End
E-DS—External Driveshaft
E-RW—External Rear Wheels
Eis—Eisemann
Eng—Unit with engine
Exi—Exide
FF—Full Floating
Fli—Flint
Fl Pr—Full pressure to all bearings including wrist pins
Ful—Fuller
G—Gravity
Gem—Gemmer
Glo—Globe
Gou—Gould
HaS—Hall Scott
Herc—Hercules
Hink—Hinkley
Hob—Hobbs
I—Both valves in head
I-FW—Internal Four Wheel
I G—Internal Gear
Ind—Indestructible
I-RW—Internal Rear Wheels
KU—Kicked Up
L—"L" Head

Mechanical Specifications

MAKE AND MODEL	GENERAL								BATTERY						PERFORMANCE	
	Body Type	Number of Passengers	Price Complete	Price Without Battery	Wheel base (Ins.)	Tread (Ins.)	Tire Size (Ins.)	Weight Complete (Lbs.)	Make	Model	Price	Voltage	Ampere Hour Capacity	Location	Miles per Charge with Full Load	Speed with Full Load (M.P.H.)
Detroit.....90	Coupe.....	4	$2800	$2575	100	56	32x4	.....	Phila.....	WTXI.....	$414	84	153	½UH & ½RC...	80-100	25
Detroit.....91-3	Brougham...	5	3500	3250	100	56	32x4½	3950	Phila.....	WTXI.....	435	84	175	½UH & ½RC...	80-100	25
Milburn.....27-L	Brougham...	5	2235	Var.....	105	55	33x4	3080	Phila.....	13-WTXI....	....	80	153	½UH & ½RC...	70-90	24
Rauch & Lang.....S-66	Sedan.....	4	4250	Var.....	102	56	32x4½	Var.....	Exide‡....	Special.....	Var.....	....	175-200	½UH & ½RC...	60-100	25
Rauch & Lang.....B-68	Brougham...	4	4250	Var.....	102	56	32x4½	4200	Exide‡....	MV-11.....	Var.....	95	180	½UG & ½RC...	60-100	28
Rauch & Lang.....C-55	Coach.....	5	4250	Var.....	102	56	33x4½	Var.....	Exide‡....	Special.....	Var.....	....	175-200	½UH & ½RC...	60-100	25

ABBREVIATIONS:

Art—Artillery
Elw.-Par—Elwell-Parker
F. Ca—Floating Cantilever
Gen. Elec—General Electric
Phila—Philadelphia
Tor. Arm—Torque Arm
Tor. Tube—Torque Tube
Under F—Under Floor
Under S—Under Seat
Unit with J. S—Unit with Jackshaft

1924 Gasoline Motor Buses

designed and sold exclusively for Passenger Transportation

having ‡‡ sign in "Current Specification of Gasoline Trucks," pages 409-414.

MISSION						REAR AXLE				BRAKES				SPRINGS			RUNNING GEAR						MISCELLANEOUS						
Gearset				Power Tire Pump	Universal Joint, Number and Make				Total Ratio from Engine to Drive Wheels on Direct	Service		Emergency		Front	Rear	Shackles Type, Front and Rear	Front Axle Make	Steering Gear			Wheels		Frame		Shock Absorbers	Road Clearance	
Make	Location	Number of Forward Speeds	Low Gear Reduction			Make and Model	Final Drive	Type		Type and Location	Braking Area (Sq. Ins.)	Type and Location	Braking Area (Sq. Ins.)	Length and Width (Ins.)	Length and Width (Ins.)			Make	Type	Outside Dia. of Minimum Turning Circle	Make	Type and Material	Body Allowance (Lbs.)	Height to Top of Frame at Dash (Ins.)	Type at Rear	Outriggers		Min. with Specified Tire Size (Ins.)	Min. with Specified Tire Size (Ins.)
Cot	Eng.	4	5.20	Opt.	2-Blo.	Tim. 6511	Wo.	F F.	6.00	I-Rw.	247	I-Rw.	247	42 -3	64 -3	M-M.	Tim.	Ros.	C&L.	68	Bud.	D-P.	3000	27	KU	UT.	No.	10 -36	5 -36
Ful.	Se U.	8	....	Stk.	2-Blo.	Vig. 425	I G.	I F.	5.40	I-Fw.	678	I-Rw.	....	40 -2½	40 -2½	M-M.	Shu.	Ros.	C&L.	69	Spe.	D-C.	3000	26	St.	Ut.	Yes.	6½-32	.....
B-L.	Eng.	4	....	Stk.	2-Spi.	Tim. 6560	Wo.	F F.	6.70	I-Rw.	....	I-Rw.	....	40 -2½	56 -3	M-M.	She.	Ros.	W&S.	36	Bud.	D-P.	6000	31½	St.	AT.	No.	5½-52	6½-65
B-L.	Eng.	4	5.35	Opt.	2-Spi.	Col. 52001	S B.	F F.	5.12	E-Rw.	120	I-Rw.	108	46 -2½	60 -3	M-M.	Col.	Gem.	W&W.	....	Ind.	D-P.	....	28½	KU	UT.	No.	10 -30	10 -32
B-L.	Eng.	4	5.35	Opt.	2-Spi‡.	Cla. 3D	I G.	F F.	7.00	E-DS.	195	I-Rw.	300	46 -3	60 -3½	M-M.	Shu.	Gem.	W&W.	62½	Sew.	D-P.	3000	27	KU	UT.	No.	7 -36	10 -36
B-L.	Eng.	3	3.36	Opt.	2-Spi.	Tim. 6460	Wo.	½ F	6.00	I-Rw.	152	I-Rw.	152	40 -2½	54 -2½	M-M.	Col.	Gem.	W&W.	60	Van.	D-P.	2500	32	St.	UT.	No.	11-36	11¼-38
B-L.	Eng.	4	5.35	Opt.	2-Spi.	Tim. 6560	Wo.	F F.	6.80	I-Rw.	184	I-Rw.	184	42 -2½	56 -3	M-M.	Col.	Gem.	W&W.	60	Van.	S-C.	3000	32	St.	UT.	No.	11-36	12 -40
B-L.	Eng.	4	5.35	Opt.	2-Sne.	Tim. 6511	Wo.	F F.	6.80	I-Rw.	234	I-Rw.	234½	42 -2½	60 -3	M-M.	Shu.	Gem.	W&W.	54	Van.	S-C.	3500	25	KU	Opt.	No.	7 -36	6½-36
B-L.	Eng.	4	4.00	.....	4-Pet.	She. W103	Wo.	½ F	6.50	I-Rw.	....	I-Rw.	....	38	48	.....	She.	Ros.	S&N.	....	Mot.	S-W.	....	31½	St.	AT.	....	12½-35	11¼-38
B-L.	Eng.	4	....	N P.	4-Spi.	Tim. 6511	Wo.	F F.	6.00	I-Fw.	130	I-Fw.	130	41 -2½	58 -3	M-M.	Tim.	Ros.	C&L.	74	Bud.	D-P.	....	19¾	KU	AT.	Yes	7½-36	8½-38
B-L.	Eng.	....	....	N P.	4-Spi.	Tim. 6511	Wo.	F F.	4.00	I-Rw.	130	I-Rw.	130	41 -2½	56 -3	M-M.	Tim.	Ros.	C&L.	36	Bud.	D-P.	....	19¾	KU	AT.	Yes	7½-36	9 -38
Own.	SeU.	4	4.00	N P.	2-Sne.	Tim. 6412	Wo.	½F.	5.40	I-Rw.	182	I-Rw.	182	48 -3	62 -3	R-R.	Tim.	Ros.	S&N.	62	Own.	S-C.	2575	26	KU	UT.	Yes	9 -34	7 -34
Own.	SeU.	4	4.00	N P.	2-Sne.	Own.	I G.	F F.	6.67	E-DS.	207	E-Rw.	320	48 -3½	56 -3½	M-M.	Own.	Ros.	S&N.	65	Own.	S-C.	4160	18	KU	UT.	No.	8½-36	5½-36
Own.	SeU.	4	4.84	Opt.	2-Spi.	Tim. 3560	Wo.	F F.	5.66	I-Rw.	185	I-Rw.	185	42 -2½	50 -2½	M-M.	Own.	Ros.	S&N.	60	Bud.	D-P.	3000	....	St.	UT.	No.	....	7½-32
Own.	SeU.	4	4.84	Stk.	2-Spi.	Tim. 6511G	Wo.	F F.	5.40	I-Rw.	454	E-DS.	84	42 -3	60 -3½	M-M.	Tim.	Ros.	S&N.	60	Day.	S-C.	3400	25½	KU	AT.	No.	7 -36	7 -36
B-L.	Eng.	....	....	....	2-M E	Wis. 65C	D R	....	....	....	....	E-DS.	....	44 -2½	60 -3	M-M.	Shu.	Ros.	S&N	....	Bud.	B-P.	3500	26	KU	Opt.	No.	10 -36	11 -36
Ful.	Eng.	3	3.00	.....	3-Opt.	Tim. 6352	Wo.	½ F	6.20	I-Rw.	....	I-Rw.	....	44 -	52 -	.....	Tim.	Ros.	S&N	....	.....	.....	.....	.....	St.	UT.	.....	.....	.....
Ful.	Eng.	3	3.00	.....	3-Opt.	Tim. 6460	Wo.	½ F	6.00	I-Rw.	....	I-Rw.	....	44 -	52 -	.....	Tim.	Ros.	S&N	....	.....	.....	.....	.....	St.	UT.	.....	.....	.....
Own.	Eng.	3	4.00	Opt.	2-Own	Own.	I G.	F F.	8.00	I-Rw.	193	I-Rw.	196	40½-2½	54 -2½	M-M.	Own.	Own.	W&W.	48	Own.	S-W.	.....	.....	.....	.....	.....	.....	.....
Own.	Eng.	4	3.12	Stk.	2-Own	Own.	I G.	F F.	8.00	I-Fw.	563	E-DS.	96	41¼-2½	57¼-3	M-M.	Shu.	Own.	W&W.	70	Bud.	D-P.	2800	24½	KU	UT.	No.	.....	.....
.....	Eng.	.....	.....	.....	Spi.	Wis. 60B	D R	.....	.....	.....	.....	.....	.....	.....	.....	.....	Shu.	Ros.	.....	.....	Whi.	.....	.....	.....	.....	.....	.....	.....	.....
Own.	Eng.	4	3.22	Opt.	2-Spi.	Own.	D R	F F.	5.80	I-Rw.	255	E-DS.	144	42½-3	56¼-3½	R-R.	Own.	Own.	W&W.	....	Bud.	D-P.	3000	25¼	St.	UT.	No.	5½-32	8¼-32
Ful.	Eng.	3	....	....	3-	Wal. 25A	D R	F F.	7.66	-Rw.	....	-Rw.	....	.....	.....	M-M.	Shu.	Ros.	.....	66	St M.	.....	3500	26	.....	.....	.....	.....	.....
Cot.	Eng.	3	3.68	Opt.	2-Spi‡.	Col. 52000	S B.	F F.	5.10	E-Fw.	....	I-Rw.	....	40 -2½	60 -2½	M-M.	Shu.	Lav.	S&N	....	Whi.	D-A.	2400	23½	KU	UT.	No.	11 -32	10 -32
Cot.	Eng.	4	5.20	Opt.	2-Spi‡.	Wis. 120K	D R	½ F	6.16	I-Rw.	....	I-Rw.	....	44 -2½	56 -3	M-M.	Tim.	Ros.	S&N	59	Ind.	D-P.	3200	26	KU	AT.	No.	9 -36	10½-36
B-L.	Eng.	3	4.09	Opt.	2-Pet.	Tim. 5512	Wo.	½ F	5.30	E-Rw.	....	I-Rw.	....	34½-2½	56 -3	M-M.	Tim.	Ros.	C&L.	....	Own.	D-A.	2000	20	KU	AT.	No.	.....	.....
B-L.	Eng.	4	5.35	Opt.	2-Pet.	Tim. 6410	Wo.	½ F	5.25	I-Rw.	....	I-Rw.	....	38 -2½	56 -3	M-M.	Tim.	Ros.	C&L	....	Bud.	D-P.	3000	21	KU	AT.	No.	.....	.....
B-L.	Eng.	4	5.35	Opt.	2-Pet.	Tim. 6511	Wo.	F F.	6.00	I-Rw.	....	I-Rw.	....	39½-2½	56 -3½	M-M.	Tim.	Ros.	C&L.	....	Bud.	D-P.	3500	22	KU	AT.	No.	.....	.....
Ful.	Eng.	3	4.00	Stk.	1-Blo.	Fli. 72Ba	S B.	F F.	4.90	E-Rw.	84	I-Rw.	84	31 -2	50 -2¼	M-M.	Con.	Lav.	S&N	50	Whi.	D-C.	2000	27	KU	UT.	No.	9 -32	10 -32
B-L.	SeU.	4	....	.....	4-Spi.	Atl.	I G.	D....	7.00	-Rw.	....	-Rw.	....	.....	.....	M-M.	Shu.	Ros.	.....	70	Ind.	.....	5900	20	.....	.....	.....	8 -34	8 -34
B-L.	SeU.	4	....	Opt.	2-Spi.	Tim.	Wo.	F F.	Opt.	I-Rw.	....	I-Rw.	....	.....	.....	M-E.	Tim.	Gem.	W&W.	66	Bud.	D-P.	.....	.....	.....	.....	.....	.....	.....
B-L.	Eng.	4	5.35	Stk.	2-Uni‡.	Tim. 6460	Wo.	½ F	6.00	I-Rw.	....	I-Rw.	....	48 -3	54 -3	M-M.	Tim.	Ros.	S&N	....	Bud.	D-P.	2200	31	St.	UT.	No.	11½-35	11½-35
B-L.	Eng.	4	5.35	Stk.	2-Uni‡.	Tim. 6560	Wo.	F F.	6.00	I-Rw.	....	I-Rw.	....	48 -3	54 -3	M-M.	Tim.	Ros.	S&N	....	Bud.	D-P.	2800	32	St.	UT.	No.	13¼-36	11¼-36
B-L.	SeU.	4	5.35	Opt.	2-Spi.	Tim. 6511A	Wo.	½ F	6.50	I-Rw.	....	I-Fw.	....	46 -3	62 -4	M-M.	Shu.	Ros.	W&S.	....	Bud.	D-P.	.....	.....	.....	.....	.....	.....	.....
Own.	Eng.	4	....	Opt.	2-Spi.	Own.	D R	½ F	5.60	E-Rw.	....	I-Rw.	....	41½-2½	60 -3	M-M.	Own.	Own.	W&S.	....	Bud.	S-P.	....	30½	St.	AT.	....	.....	.....
B-L.	Eng.	4	3.95	Opt.	2-Spi‡.	Wis. 60A	D R	½ F	6.00	I-Rw.	....	I-Rw.	....	42 -2½	60 -3	M-M.	Con.	Gem.	W&W.	75	Whi.	D-A.	4000	21	KU	AT.	No.	9 -32	10 -34
B-L.	Eng.	4	3.95	Opt.	2-Pet.	Wis. 800G	Wo.	½ F	6.00	I-Fw.	....	I-Fw.	....	42 -2½	52 -3	M-M.	Tim.	Gem.	W&W.	98	Whi.	D-A.	4000	21	KU	AT.	Yes	8 -32	8 -32
Own.	SeU.	4	5.35	.....	2-‡...	Own.	Wo.	½ F	6.25	I-Fw.	774	I-Rw.	....	50 -3½	68½-4	R-R.	Own.	Own.	W&W.	34	.....	S-C.	....	23½	KU	UT.	No.	.....	.....

L-N—Leece-Neville
Lav—Lavine
M—Magneto
MDD—Multiple Dry Disk
M&E—Merchants & Evans
Mot—Motor Wheel Corp.
N-E—North East
NP—No provision
Opt—Optional
P—Pneumatics
Pet—Peters
P-G—Pressure Gun
PrCs—Pressure to all crankshaft and connecting rod bearings—splash to other parts
R—Rubber
R & V—R & V Knight
Rem—Remy
Ros—Ross
SB—Spiral Bevel
S-C—Spoked Cast Steel
SeU—Separate Unit
Sew—Sewell
She—Sheldon
Shu—Shuler
Sl—Sleeve
Sne—Snead
S&N—Screw & Nut
SP—Single Plate
S-P—Spoked Pressed Steel
Spl—Splitdorf
Spi—Spicer
Spe—Special
Spla—Splash
SpPr—Pressure to main crankshaft bearings only, splash to connecting rod and other parts
St—Straight
Stk—Stock
Str—Stromberg
Sta—Standard
St.M—St. Marys
Su—Suction
S-W—Spoked Wood
Tim—Timken
Uni—Universal
UT—Unattached
V—Vacuum
Ves—Vesta
Vig—Vig Tor
Wal—Walker
Wes—Westinghouse
Whi—Whitcomb
Wil—Willard
Wis—Wisconsin Axle
Wisc—Wisconsin
Wo—Worm
W&S—Worm & Sector
WSM—Wellman-Seaver-Morgan
W&W—Worm and Wheel
Yell—Yellow Sleeve Valve
Zen—Zenith

of 1924 Motor Cycles

MOTOR					CONTROLLER			DRIVE					SPRINGS			
Make	Model	Number	Total Horse Power	Location	Make	Location	Number of Forward Speeds	Type of Final Drive	Type of Rear Axle	Total Reduction (Motor to Wheels)	Propulsion Taken by	Torque Taken by	Type Front	Type Rear	Wheels (Standard Equipment)	MAKE AND MODEL
Elw-Par.	22-17	1	3	Unit with J S.	Own.	Under S.	5	.....	¾ Float.	.....	Springs.	Springs.	½ Ell.	½ Ell.	Art.	**Detroit 90**
Elw-Par.	31-20	1	3	Unit with J S.	Own.	Under F.	5	.....	¾ Float.	.....	Tor. arm.	Tor. arm.	½ Ell.	¾ Ell.	Wire	**Detroit 91-3**
Gen. Elec.	1085	1	4	Unit with R A.	Own.	Under S.	4	Worm.	¾ Float.	9.75	Springs.	Tor. tube.	½ Ell.	F. Ca.	Wire	**Milburn 27-L**
Own.	....	1	3½	Unit with R A.	Own.	Under S.	5	Worm.	¾ Float.	8.60	Springs.	Tor. arm.	½ Ell.	½ Ell.	Art.	**Rauch & Lang Š-66**
Own.	....	1	3½	Unit with R A.	Own.	Under S.	5	Worm.	Float.	8.60	Springs.	Tor. arm.	½ Ell.	½ Ell.	Art.	**Rauch & Lang B-68**
Own.	....	1	3½	Unit with R A.	Own.	Under S.	5	Worm.	¾ Float.	8.60	Springs.	Tor. arm.	½ Ell.	¾ Ell.	Art.	**Rauch & Lang C-55**

Unit with R. A—Unit with Rear Axle

Var—Varies according to make of battery employed

½ Ell—½ Elliptic
¾ Ell—¾ Elliptic
¾ Float—¾ Floating

½ U. H. and ½ R. C—½ under hood and ½ rear compartment
‡—Make Optional

Mechanical Specifications

MAKE AND MODEL	Tons Capacity	Weight with Battery (Lbs.)	CHASSIS PRICE with Battery	CHASSIS PRICE without Battery	Wheel Base (Ins.)	TIRES, TYPE AND SIZE Front, (Ins.)	TIRES, TYPE AND SIZE Rear, (Ins.)	MOTORS Location	MOTORS Make	MOTORS Number	MOTORS Total Horse Power	CONTROLLER Location	CONTROLLER Lever Location	CONTROLLER Number of Forward Speeds	DRIVE First Reduction	DRIVE Final Drive	DRIVE Total Gear Reduction
Autocar	1	Var.	Var.	2400	107	S-34x4	S-34x5	Unit with R A.	G E.	1	8	Under S.	Left of S.	5	Bevel.	Spur.	
Autocar	2	Var.	Var.	2800	120	S-34x5	S-34x6	Unit with R A.	G E.	1	8	Under S.	Left of S.	5	Bevel.	Spur.	
Autocar	3	Var.	Var.	3200	128	S-34x5	S-36x8	Unit with R A.	G E.	1	8	Under S.	Left of S.	5	Bevel.	Spur.	
Autocar	4	Var.	Var.	4000	128	S-34x5	S-36x8	Unit with R A.	G E.	1	8	Under S.	Left of S.	5	Bevel.	Spur.	
Autocar	5	Var.	Var.	4300	136	S-34x5	S-36x14	Unit with R A.	G E.	1	8	Under S.	Left of S.	5	Bevel.	Spur.	
Commercial T. D1	½	Var.	Var.		100	S-36x3	S-36x3½	Unit with R A.	G E.	2	3	Steer C.	Below S W.	4	Spur.	Spur.	11.5
Commercial T. D1-5	¾	Var.	Var.		116	S-36x3	S-36x4	Unit with R A.	G E.	2	3	Steer C.	Below S W.	4	Spur.	Spur.	11.5
Commercial T. B1-5	¾	Var.	Var.		91½	S-36x3	S-36x4	Unit with R A.	G E.	2	3	Steer C.	Below S W.	4	Spur.	Spur.	11.5
Commercial T. D-2	1	Var.	Var.		124	S-36x3½	S-36x5	Unit with R A.	G E.	2	3	Steer C.	Below S W.	4	Spur.	Spur.	11.5
Commercial T. B-4	2	Var.	Var.		116	S-36x4	S-36x4d	Unit with R A.	G E.	2	4	Steer C.	Below S W.	4	Spur.	Spur.	12.1
Commercial T. C-6	3	Var.	Var.		122	S-36x4	S-36x4d	Unit with R A.	G E.	2	3	Steer C.	Below S W.	4	Spur.	Spur.	20.1
Commercial T. C-7	3½	Var.	Var.		126	S-36x5	S-36x5d	Unit with R A.	G E.	2	4	Steer C.	Below S W.	4	Spur.	Spur.	17.3
Commercial T. A-7	3½	Var.	Var.		122	S-36x6	S-36x4d	On F & R Axles	G E.	4	6	Steer C.	Below S W.	4	Spur.	Spur.	17.3
Commercial T. A-10	5	Var.	Var.		132	S-36x7	S-36x5d	On F & R Axles	G E.	4	6	Steer C.	Below S W.	4	Spur.	Spur.	20.1
Kelland. A-H	½	3400*	Var.		106	S-36x3	S-36x3	Sep Unit.	G E.	1	3-6	Under F.	Below S W.	4	S-Cha.	R-Cha.	9.0
Kelland. B-H	¾	3700*	Var.		106	S-36x3½	S-36x3½	Sep Unit.	G E.	1	3-6	Under F.	Below S W.	4	S-Cha.	R-Cha.	10.4
Kelland. BT	¾	3100*	$2750*		102	S-34x3½	S-34x3½	Sep Unit.	G E.	1	3-6	Under F.	Right of S.	4	Spur.	Heli.	11.0
Kelland. BTS	¾-1½	3000*	Var.		102	S-34x3	S-34x3	Sep Unit.	G E.	1	3-6	Under F.	Right of S.	4	Spur.	Heli.	9.5
Kelland. CH	1	4000*	Var.		106	S-36x3½	S-36x4	Sep Unit.	G E.	1	3-6	Under F.	Below S W.	4	S-Cha.	R-Cha.	11.3
Kelland. CT	1	3400*	Var.		102	S-34x3½	S-34x4	Sep Unit.	G E.	1	3-6	Under F.	Right of S.	4	Heli.	Heli.	13.0
Lansden	½-¾	3250	Var.	$1600	108	P-32x4½	P-32x4½	Unit with R A.	G E.	1	3	In Dash.	Below S W.	4	Herr.	Bevel.	10.0
Lansden	1	3750	Var.	1850	112	P-33x5	P-33x5	Unit with R A.	G E.	1	3	In Dash.	Below S W.	4	Herr.	Bevel.	10.0
Lansden	2	6750	Var.	2250	121	C-36x4	C-36x3½d	Unit with J S.	G E.	1	3½	In Dash.	Below S W.	5	Bevel.	R-Cha.	12.0
Lansden	3½	8150	Var.	2950	133	C-36x5	C-36x5	Unit with J S.	G E.	1	4½	In Dash.	Below S W.	5	Bevel.	R-Cha.	14.0
Lansden	5	10500	Var.	3350	146	C-36x6	C-36x6d	Unit with J S.	G E.	1	5½	In Dash.	Below S W.	5	Bevel.	R-Cha.	14.0
Milburn. 27D	¼	2925	1600	1085	105	P-33x4	P-33x4	Unit with R A.	G E.	1	4	Under S.	Left of S.	4	None.	Worm.	11.6
Milburn. 43	½-¾	3370	2195	1585	115	P-32x4½	P-32x4½	Unit with R A.	G E.	1	4½	Under F.		4	None.	Worm.	10.3
Milburn. 40	1-1¼	3910	2650	1985	128	P-32x4½	P-33x5	Unit with R A.	G E.	1	4½		Right of S.		None.	Worm.	
O. B. B	2	Var.	Var.	2650	107	S-36x4	S-36x3½d	Unit with J S.	G E.	1		Under S.	Left of S.	Var	S-Cha.	S-Cha.	
O. B. C	3½	Var.	Var.	3750	135	S-36x5	S-36x4d	Unit with J S.	G E.	1		Under S.	Left of S.	Var	S-Cha.	R-Cha.	
O. B. D	5	Var.	Var.	3950	143	S-36x6	S-36x5d	Unit with J S.	G E.	1		Under S.	Left of S.	Var	S-Cha.	S-Cha.	
Steinmetz. 10	½	3350*	2050*	1700	108	P-32x4½	P-32x4½	Unit with R A.	Own.	1	3	Back S.	Left of S.	4	Bevel.	Spur.	13.4
Steinmetz. 15	¾	3800*	2255*	1850	114	P-33x5	P-33x5	Unit with R A.	Own.	1	3	Back S.	Left of S.	4	Bevel.	Spur.	13.4
Walker. 12	½	Var.	Var.		104	S†-32x3	S†-32x3½	Unit with R A.	G E.	1	3	Under F.	Below S W.	4	None.	Bevel.	5.5
Walker. 15	¾	Var.	Var.		94	S-34x3	S-36x3½	Unit with R A.	West.	1		Under S.	Left of S.	5	None.	Spur.	16.8
Walker. 22	1	Var.	Var.		101	S-34x3½	S-36x4	Unit with R A.	West.	1		Under S.	Left of S.	5	None.	Spur.	16.8
Walker. 42	2	Var.	Var.		114	S-36x4	S-36x6	Unit with R A.	West.	1		Under S.	Left of S.	5	None.	Spur.	14.6
Walker. P	3½	Var.	Var.		131	S-36x5	S-38x5d	Unit with R A.	West.	1		Under S.	Left of S.	5	None.	Spur.	18.1
Walker. N	5	Var.	Var.		141	S-36x6	S-38x6d	Unit with R A.	West.	1		Under S.	Left of S.	5	None.	Spur.	18.1
Walter. HD	1	4000	2650	2200	98	S-32x3½	S-32x4	Sep Unit.	Diehl.	1	4½	Under S.	Left of S.	5	None.	Bevel.	7.0
Walter. EN	2	6700	3975	3100	114	S-36x4	S-36x7	Unit with J S.	G E.	1	5½	Under S.	Right of S.	5	Bevel.	Spur.	10.0
Walter	5	10100	5700	4500	150	S-36x6	S-40x6D	Unit with J S.	G E.	1	7	Under S.	Right of S.	5	Bevel.	Spur.	14.0
Ward. 8211	2-2½	Var.	Var.		88	P-32x4	P-33x4½	Unit with D S.	G E**	1	3	Under F.	Left of S.	4	None.	Worm.	
Ward. B222	2½-3	1650	Var.		91	S-32x3½	S-32x4	Unit with D S.	G E**	1	4	Under F.	Left of S.	4	None.	Worm.	
Ward. C211	3½-4	Var.	Var.		96	S-32x3½	S-34x5	Unit with D S.	G E**	1	4	Under F.	Left of S.	4	None.	Worm.	
Ward. E111	5-6	Var.	Var.		108	S-34x4	S-36x6	Unit with D S.	G E**	1	5	Under S.	Left of S.	4	None.	Worm.	
Ward. E211	5-6	Var.	Var.		108	S-34x4	S-36x6	Unit with D S.	G E**	1	5	Under F.	Left of S.	4	None.	Worm.	
Ward. G111	7-8	Var.	Var.		120	S-36x5	S-36x8	Unit with D S.	G E**	1	6	Under S.	Left of S.	5	None.	Worm.	
Ward. J111	10-11¼	Var.	Var.		132	S-36x6	S-36x10	Unit with D S.	G E**	1	8	Under S.	Left of S.	5	None.	Worm.	
Ward. M111	14-15½	Var.	Var.		146	S-36x7	S-40x14	Unit with D S.	G E**	1	8	Under S.	Left of S.	5	None.	Worm.	

ABBREVIATIONS:
*—With battery specified in table
**—Make optional
‡—Battery make optional
†—Pneumatics optional
Back S—Back of Seat
Below S W—Below Steering Wheel
C—Cushion
Cant—Cantilever
½ Ell—½ Elliptic
½ F—Semi-Floating
Flo—Full Floating
G. E.—General Electric
Heli—Helical Gear
Herr—Herringbone
Left of S—Left of Seat
On F & R Axles—On Front and Rear Axles
Opt—Optional
P—Pneumatic
Plat—Platform
R Cha—Roller Chain
Right of S—Right of Seat
Rad Rods—Radius Rods

Mechanical Specificat

MAKE AND MODEL	GENERAL Price	GENERAL Wheelbase (Ins.)	GENERAL Tire Size (Ins.)	GENERAL Weight with Cab (Lbs.)	ENGINE Make and Model	ENGINE No. of Cylinders, Bore and Stroke (Ins.)	ENGINE Rated H.P. (N.A.C.C.)	ENGINE Piston Displacement (Cu. Ins.)	ENGINE Compression Ratio	ENGINE Suspension	ENGINE Cylinder Head	ENGINE Number Cast in One Piece	Valves Arrangement	Valves Head Material	Valves Drive	ENGINE Piston Material	Oiling System Type	Oiling System Pump Type	ENGINE Water Circulation	Fuel System Carburetor Make	Fuel System Fuel Feed	Electrical System Ignition Make	Electrical System Ignition Current Source	Electrical System Generator and Starter Make	Electrical System Voltage
Checker. C	2340	117	32x4½	4100	Buda WTU	4-3¾x5½	22.50	226.0	4.10	3	Det.	4	L.	Cl.	Gear.	Cl.	Pr Cs.	Gear.	Pump.	Zenith.	Vac.	Bosch.	M.	West.	6-8
Driggs		108½	30x3½	2240	Own	4-2⅝x4½	11.03	97.0	5.50	3	Det.	4	L.	CI.	Heli.	Cl.	Sp Pr.	Gear.	Th S.	Zenith.	Gra.	Bosch.	M.	Bosch.	6-8
Elcar. L-6	2450	118	32x4		Cont 8R.	6-3⅜x4½	27.34	241.5	4.40	3	Det.	6	L.	Car.	Heli.	Cl.	Pr Cs.	Gear.	Pump.	Strom.	Vac.	Delco.	B.	Delco.	6-8
Kelsey. E	1900	115	32x4	3500	Lyc CH.	4-3½x5	19.60	192.4	4.10	3	Det.	4	L.	C I.	Heli.	Al.	Pr Cs.	Gear.	Th S.	Zenith.	Vac.	Bosch.	B.	Bosch.	6-8
Pennant. ‡‡	2895	118	33x4½	3800	Buda WTU	4-3¾x5½	22.50	226.4	4.10	3	Det.	4	L.	CI.	Heli.	SS.	Pr Cs.	Gear.	Pump.	Zenith.	Vac.	Bosch.	M.	West*.	6-8
Premier. 4A	2400	112	33x4½	3850	Buda WTU	4-3¾x5½	22.50	226.4	4.10	3	Det.	4	L.	CI.	Heli.	SS.	Pr Cs.	Gear.	Pump.	Zenith.	Vac.	Bosch.	B.	Bosch.	6-8
Rauch & Lang. T	2350	112	32x4	3400	Buda WU.	4-3¾x5½	22.50	226.4	4.10	3	Det.	4	L.	CI.	Heli.	SS.	Pr Cs.	Gear.	Pump.	Zenith.	Gra.	Bosch.	M.	†Dyne‡.	6-8
Reo. V	2085	113	33x4½	3465	Own.	6-3⅜x5	24.30	239.0	5.00	4	Det.	6	F.	CI§	Heli.	Al.	Sp Pr.	Pist.	Pump.	Ray.	Vac.	N.E.	B.	N-E.	6-8
White. 15-A		119	34x4½		Own.	4-3¾x5½	22.50	226.4		3	Int.	4	L.		Heli.		Splash.	Pist.	Pump.	Zenith.	Gra.		M.	N-E*	6-8
Yellow Cab. A2	1975	109	29x4½	3335	Cont V7.	4-4⅜x5	18.23	178.9		3	Int.	4	L.	Car.	Heli.	CL.	Pr Cs.	Pist.	Th S.	Zenith.	Gra.	Bosch.	M.	N-E.	6-8

ABBREVIATIONS:
*—At extra cost
§—Exhaust valve only
†—Starter at extra cost
‡‡—Delivered New York
‡—Starter Make Gray & Davis
Al—Aluminum
B—Battery
B-L—Brown-Lipe
Car—Carbon Steel
C I—Cast Iron
Col—Columbia
Cont—Continental
D—Disc
Det—Detachable
Detr—Detroit
Detl—Detlaff
Eng—Engine
Ext-DS—External Drive Shaft
Ext-Rw—External Rear Wheels
F—Valves in Head and Side
f—Fabric
Ful—Fuller
Gra—Gravity
Gem—Gemmer
Hart—Hartford
Heli—Helical Gear
Int—Integral
Int-Rw—Internal Rear Wheel
Jon—Jones
L—Both valves at side
M—Magneto
m—Metal
M D D—Multiple Dry Disc
N-E—North-East
O C—Oil Cups

of 1924 Electric Trucks

DRIVE					SPRINGS		PERFORMANCE				BATTERY									
Type of Axle or Jackshaft	Propulsion Taken By	Torque Taken By	Steering Wheel Location	Distance from Ground to Top of Frame at Dash (Ins.)	Front	Rear	Miles per Charge		Speed in M.P.H.		Location	Make	Model	Price	Voltage	Ampere Hour Capacity	Number of Plates	Number of Cells	Number of Trays	MAKE AND MODEL
							Loaded	Light	Loaded	Light										
Flo.	Springs	Springs	Left		½ Ell.	Plat.	Var.	Var.	Var.	Var.	Under F A.	Opt								Autocar
Flo.	Springs	Springs	Left		½ Ell.	Plat.	Var.	Var.	Var.	Var.	Under F A.	Opt								Autocar
Flo.	Springs	Springs	Left		½ Ell.	½ Ell.	Var.	Var.	Var.	Var.	Under F A.	Opt								Autocar
Flo.	Springs	Springs	Left		½ Ell.	½ Ell.	Var.	Var.	Var.	Var.	Under F A.	Opt								Autocar
Flo.	Springs	Springs	Left		½ Ell.	½ Ell.	Var.	Var.	Var.	Var.	Under F A.	Opt								Autocar
Flo.	Rad & Spr.	Rad & Spr.	Left	33¼	½ Ell.	½ Ell.	50		13	14	Under F A.	Opt								Commercial T	D1
Flo.	Rad & Spr.	Rad & Spr.	Left	33	½ Ell.	½ Ell.	55		13	14	Under F A.	Opt								Commercial T	D1-5
Flo.	Rad & Spr.	Rad & Spr.	Left	32¾	½ Ell.	½ Ell.	55		13	14	Under F A.	Opt								Commercial T	B1-5
Flo.	Rad & Spr.	Rad & Spr.	Left	33	½ Ell.	½ Ell.	50		12	14	Under F A.	Opt								Commercial T	D-2
Flo.	Rad & Spr.	Rad & Spr.	Left	35¼	½ Ell.	½ Ell.	45		10	12	Under F A.	Opt								Commercial T	B-4
Dead	Rad & Spr.	Rad & Spr.	Left	36½	½ Ell.	½ Ell.	40		8	10	Under F A.	Opt								Commercial T	C-6
Dead	Rad & Spr.	Rad & Spr.	Left	36¼	½ Ell.	½ Ell.	45		8	10	Under F A.	Opt								Commercial T	C-7
Dead	Rad & Spr.	Rad & Spr.	Left	38⅛	½ Ell.	½ Ell.	45		9	11	Under F A.	Opt								Commercial T	A-7
Dead	Rad & Spr.	Rad & Spr.	Left	38⅝	½ Ell.	½ Ell.	40		9	11	Under F A.	Opt								Commercial T	A-10
¼ F.	Rad Rods	None	Left	36	½ Ell.	½ Ell.	30	40	13	15	Under F A.	Edison‡	A-4		73	150	4	60	12	Kelland	A-H
⅛ F.	Rad Rods	None	Left	36	½ Ell.	½ Ell.	35	45	12	14	Under F A.	Edison‡	A-5		73	187½	5	60	12	Kelland	B-H
Flo.	Springs	Springs	Left	30	½ Ell.	½ Ell.	40	50	13	15	U S & O F A	Edison‡	A-5		73	187	5	60	11	Kelland	BT
Flo.	Springs	Springs	Left	29½	½ Ell.	½ Ell.	35	45	15	17	U H & U S.	Edison‡	A-4		73	150	4	60	11	Kelland	BTS
⅛ F.	Rad Rods	None	Left	36	½ Ell.	½ Ell.	40	50	11	13	Under F A.	Edison‡	A-6		73	225	6	60	12	Kelland	CH
Flo.	Springs	Springs	Left	30½	½ Ell.	½ Ell.	45	55	12	14	U S & O F A	Edison‡	A-6		73	225	6	60	14	Kelland	CT
Flo.	Springs	Springs	Left	30	½ Ell.	½ Ell.	50		15		U H & U S.	Opt								Lansden	
Flo.	Springs	Springs	Left	31	½ Ell.	½ Ell.	50		14		U H & U S.	Opt								Lansden	
Flo.	Rad Rods	None	Left	36	½ Ell.	½ Ell.	50		12		Under F A.	Opt								Lansden	
Flo.	Rad Rods	None	Left	39	½ Ell.	½ Ell.	45		10		Under F A.	Opt								Lansden	
Flo.	Rad Rods	None	Left	39	½ Ell.	½ Ell.	40		9		Under F A.	Opt								Lansden	
Flo.	Springs	Springs	Left	31½	½ Ell.	Cant.	50	75	20	22	U H & U S.	Philco	PX	$515	80	156	13	40	2	Milburn	27D
Flo.	Springs	Springs	Left		½ Ell.	½ Ell.	55	80	17	19	U H & U S.	Philco	PMT	655	84	180	13	42	2	Milburn	43
Flo.	Springs	Springs	Left		½ Ell.	½ Ell.	50	65	15	17	U H & U S.	Philco	PMT	724	84	210	15	42	2	Milburn	40
Dead	Rad Rods	Tor Arm	Left		½ Ell.	½ Ell.	48	52	13	15	Under F A.	Opt								O. B.	B
Dead	Rad Rods	Tor Arm	Left		½ Ell.	½ Ell.	48	52	10	11	Under F A.	Opt								O. B.	C
Dead	Rad Rods	Tor Arm	Left		½ Ell.	½ Ell.	42	45	10	11	Under F A.	Opt								O. B.	D
½ F.	Springs	Tor Arm	Left	34	½ Ell.	½ Ell.	60	70	16½	17½	U H & U S.	Opt								Steinmetz	10
½ F.	Springs	Tor Arm	Left	34	½ Ell.	½ Ell.	60	70	16½	17½	U H & U S.	Opt								Steinmetz	15
¾ F.	Springs	Springs	Left	25½	½ Ell.	½ Ell.			14	15	U H & U S.	Opt								Walker	12
Flo.	Springs	Springs	Left	32½	½ Ell.	½ Ell.	Var.	Var.	Var.	Var.	Under F A.	Opt								Walker	15
Flo.	Springs	Springs	Left	34	½ Ell.	½ Ell.	Var.	Var.	Var.	Var.	Under F A.	Opt								Walker	22
Flo.	Springs	Springs	Left	35	½ Ell.	½ Ell.	Var.	Var.	Var.	Var.	Under F A.	Opt								Walker	42
Flo.	Springs	Springs	Left	41	½ Ell.	½ Ell.	Var.	Var.	Var.	Var.	Under F A.	Opt								Walker	P
Flo.	Springs	Springs	Left	41	½ Ell.	½ Ell.	Var.	Var.	Var.	Var.	Under F A.	Opt								Walker	N
⅛ F.	Springs	Springs	Left	26	½ Ell.	½ Ell.	50	60	14	15	Under F A.	Philco	WNT	661	85	180	13	42	2	Walter	HD
Flo.	Springs	Springs	Left	36	½ Ell.	½ Ell.	40	60	11	12	Under F A.	Exide	MB1	1232	85	270	17	42	8	Walter	EN
Flo.	Springs	Springs	Left	41	½ Ell.	½ Ell.	40	50	10	11	Under F A.	Exide	MU1	1655	85	375	23	42	12	Walter	
½ F.	Springs	Springs	Left	29	½ Ell.	½ Ell.	Var.	Var.	Var.	Var.	Under S.	Opt								Ward	8211
½ F.	Springs	Springs	Left	29	½ Ell.	½ Ell.	Var.	Var.	Var.	Var.	Under S.	Opt								Ward	B222
½ F.	Springs	Springs	Left	31	½ Ell.	½ Ell.	Var.	Var.	Var.	Var.	Under S.	Opt								Ward	C211
½ F.	Springs	Springs	Left	34⅝	½ Ell.	½ Ell.	Var.	Var.	Var.	Var.	Under F A.	Opt								Ward	E111
½ F.	Springs	Springs	Left	32	½ Ell.	½ Ell.	Var.	Var.	Var.	Var.	Under S.	Opt								Ward	E211
½ F.	Springs	Springs	Left	35	½ Ell.	½ Ell.	Var.	Var.	Var.	Var.	Under F A.	Opt								Ward	G111
½ F.	Springs	Springs	Left	38	½ Ell.	½ Ell.	Var.	Var.	Var.	Var.	Under F A.	Opt								Ward	J111
½ F.	Springs	Springs	Left	40	½ Ell.	½ Ell.	Var.	Var.	Var.	Var	Under F A.	Opt								Ward	M111

S—Solid
S Cha—Silent Chain
Sep Unit—Separate Unit
Spr—Springs
Steer C—Steering Column
Tor Arm—Torque Arm

U H & U S—Under hood and under seat
Under F—Under floor board
Under F A—Under frame amidships
Under S—Under Seat

Unit with D S—Unit with Drive Shaft
Unit with J S—Unit with Jackshaft
Unit with R A—Unit with Rear Axle

U S & O FA—Under seat and over frame amidships
Var—Varies according to make and capacity of battery employed
West—Westinghouse

ions of 1924 Taxicabs

TRANSMISSION												RUNNING GEAR										
Clutch		Gearset			Universal Joints		Rear Axle					Brakes				Steering Gear						MAKE AND MODEL
Make	Type	Make	Location	No. of Forward Speeds	Number and Make	Type	Make	Type	Final Drive	Gear Ratio	Propulsion Taken By	Torque Taken By	Type and Location: Foot	Type and Location: Hand	Shackles Type	Front Axle Make	Make	Type	Chassis Lubrication	Length of Rear Spring (Ins.)	Wheels, Type	Frame Make	
Ful.	M D D.	Ful.	Eng.	3	1-Blood.	m.	Col.	¾ F.	S B.	4.87	Sp.	Sp.	Ext-Rw.	Int-Rw.	m.	Col.	Jon.	S & N.	P G.	57⅜	D.	P & B	Checker C
Ful.	M D D.	Ful.	Eng.	3	2-Spicer	m.	Own.	½ F.	S B.	4.75	Sp.	Sp.	Ext-Rw.	Int-Rw.	m.	Sal.			P G.		D.		Driggs
Warn.	M D D.	Warn.	Eng.	3	1-Hart.	m.	Sal.	¾ F.	S B.	4.70	Sp.	Sp.	Ext-Rw.	Int-Rw.	m.	Sal.	Gem.	W & W.	O C.	52		Smi.	Elcar L-6
B & B.	S P.	W-M.	Eng.	3	2-Spicer	m.	Sal.	¾ F.	S B.	5.10	Sp.	Sp.	Ext-Rw.	Int-Rw.	m.	Sal.	Lav.	S & N.	P G.	55	D.	Hyd.	Kelsey E
Ful.	M D D.	Ful.	Eng.	3	2-Blood.	m.	Col.	¾ F.	S B.	4.87	Sp.	Sp.	Ext-Rw.	Int-Rw.	m.	Col.	Jon.	S & N.	P G.	57	D.	Sav.	Pennant ++
Ful.	M D D.	Ful.	Eng.	3	2-Blood.	m.	Col.	¾ F.	S B.	4.70	Sp.	Sp.	Ext-Rw.	Int-Rw.	m.	Col.	Own.	W & W.	P G.	57½	D.	P & B.	Premier 4A
Detl.	M D D.	Detr.	Eng.	3	2-Spicer	m.	Sta.	½ F.	S B.	5.10	Sp.	Sp.	Ext-Rw.	Ext-D S.	m.	Sta.	Gem.	W & W.	P G.	59½	D.	P & B.	Rauch & Lang T
Own.	M D D.	Own.	SeU.	3	4-Own.	m-f.	Own.	½ F.	S B.	4.70	Sp.	T A.	Ext-Rw.	Int-Rw.	m.	Own.	Own.	B P S.	P G.	55	D.	Own.	Reo V
Own.	S P.	Own.	SeU.	4			Own.	½ F.	S B.		Rad.	Sp.	Ext-Rw.	Int-Rw.	M.	Own.	Own.	W & S.	P G.				White 15-A
B-L.	M D D.	B-L.	Eng.	3	2-Spicer	m.	Tim.	½ F.	S B.	4.90	Sp.	Sp.	Ext-Rw.	Ext-D S.	r.	Tim.	Gem.	W & W.	P G.	56	D.		Yellow Cab A2

Opt—Optional
P & B—Parish & Bingham
B P S—Bevel, Pinion & Sector
P G—Pressure Gun
PrCs—Pressure to all crankshaft and connecting rod bearings, splash to other parts
Pist—Piston
r—Rubber

Rad—Radius Rods
Rayf—Rayfield
Sal—Salisbury
Sav—Savage
S B—Spiral Bevel
SeU—Separate Unit
S & N—Screw and Nut
Sp—Springs

S P—Single Plate
Sp Pr—Pressure to main crankshaft bearings only, splash to connecting rods and other parts.
Smi—Smith
S S—Semi Steel
Sta—Standard
Strom—Stromberg

T A—Torque Arm
Th S—Thermo Siphon
Tim—Timken
Vac—Vacuum
Warn—Warner
West—Westinghouse
W & S—Worm and Sector
W & W—Worm and Wheel

Mechanical Specifications

MAKE AND MODEL	ENGINE											IGNITION AND LIGHTING SYSTEM					
									Carburetor		Oiling System				Ignition		Lighting		
	Type	Number of Cylinders—Bore and Stroke (Ins.)	Cycle	Rated H.P. (N.A.C.C.)	R.P.M. at Maximum Brake H.P.	Piston Displacement (Cu. Ins.)	Valve Arrangement	Piston Material	Make	Size (Ins.)	Type	Pump Type	Lubricant Type	Type	Current Source	Make	Stock or Optional	Type	Make
Ace.....1924	Vert.	4-2 3/4 x3 1/2	4	12.10	20-3400	77.2	OhI Si E.	AlumA*	Schebler	1	Splash	Gear	OO	Ge & Ig SeU	Mag	Simms	Stk	Ele	Split
Cleveland.....24SE	Vert.	1-2 3/4 x2 3/4	2	3.02	.....	16.3	3 Port	Cast I.	Zenith	3/4	Splash	None	OG	Ge & Ig SeU	Mag	Bosch	Opt*	Ele	Split
Emblem.....106	Vee	2-2 5/8 x3	4	5.51	5-1800	50.0	OhI Si E.	Cast I.	Schebler	3/4	Splash	None	OO	Ign Syst only	Mag	Eric	Stk	Gas	Anny
Excelsior.....1924	Vee	2-3 21/64 x3 1/2	4	10.51	16-3600	61.0	OhI Si E.	Cast I.	Schebler	1	Sp-Pr	Pist.	OO	Ge & Ig SeU	Mag	Split	Stk	Ele	Split
Evans Power Cycle.....G	Vert.	1-2 x1 3/4	2	.....	1.5-3000	5.5	3 Port	Cast I.	Own	5/8	Splash	None	OG	Ge & Ig Comb	Mag	Bosch	Stk	Ele	Bosch
Harley-Davidson.....24FD&JD	Vee	2-3 7/16 x4	4	9.45	22-3600	74.0	OhI Si E.	Cast I.	Schebler	1 1/4	Splash	Pist.	OO	Ge & Ig Comb	Bat	Own	Stk	Ele	Own
														Ign Syst only	Mag	Bosch	Opt*	Gas	None
Harley-Davidson.....24FE&JE	Vee	2-3 5/16 x3 1/2	4	8.76	19-3600	61.0	OhI Si E.	Alum A.	Schebler	1 1/4	Splash	Pist.	OO	Ge & Ig Comb	Bat	Own	Stk	Ele	Own
														Ign Syst only	Mag	Bosch	Opt*	Gas	None
Harley-Davidson FDCA&JDCA	Vee	2-3 7/16 x4	4	9.45	24-4000	74.0	OhI Si E.	Alum A.	Schebler	1 1/4	Splash	Pist.	OO	Ge & Ig Comb	Bat	Own	Stk	Ele	Own
														Ign Syst only	Mag	Bosch	Opt*	Gas	None
Henderson.....DeLuxe	Vert.	4-2 11/16 x3 1/2	4	11.66	28-3800	79.4	Si by Si.	Alum A.	Zenith	1	F Press.	Gear	OO	Ge & Ig SeU	Mag	Simms	Stk	Ele	Split
Indian.....“G” Scout	Vee	2-2 3/4 x3 1/16	4	6.05	11.5-3400	36.4	Si by Si.	Cast I.	Schebler	1	Splash	Pist.	OO	Ge & Ig SeU	Mag	Split	Stk	Ele	Split
Indian.....“H” Chief	Vee	2-3 1/8 x3 31/32	4	7.81	19.3-3400	60.9	Si by Si.	Cast I.	Schebler	1 1/4	Splash	Pist.	OO	Ge & Ig SeU	Mag	Split	Stk	Ele	Split
Indian.....Big Chief	Vee	2-3 1/4 x4 7/16	4	8.45	23-3400	73.7	Si by Si.	Cast I.	Schebler	1 1/4	Splash	Pist.	OO	Ge & Ig SeU	Mag	Split	Stk	Ele	Split
Ner-A-Car.....3 Series	Vert.	1-2 1/2 x2 3/4	2	2.50	.....	13.5	3 Port	Cast I.	Brown & B	15/16	Splash	None	OG	Ge & Ig Comb	Mag	Eisem	Stk	Ele	Eisem
Reading Standard.....24RSE	Vee	2-3 3/8 x4	4	9.10	16	71.6	Si by Si.	Alum A.	Zenith	1 1/4	Splash	Gear	OO	Ge & Ig Comb	Mag	Bosch	Stk	Ele	Bosch
Schickel.....T	Vert.	1-3 x2 1/2	2	3.60	.....	17.6	2 Port	Cast I.	Own	15/16	Splash	None	OG	Ign Syst only	Mag	Split	Opt*	Ele	Own

ABBREVIATIONS:
Alum A—Aluminum Alloy
Bat—Battery
Brown & B—Brown & Barlow
Cast I—Cast Iron
Diam—Diamond
D Loop—Double Loop
Dry D—Dry Disk
Eisem—Eisemann
Ele—Electric
Eric—Ericsson
Ext—External
FPress—Full pressure
Fric—Friction
Ge & Ig Comb—Generator and Ignition Units Combined
Ge & Ig Se U—Generator and Ignition separate Units
G on HB—Grip on Handle Bars
HS—Helical Spring
Hand L—Handle Lever
Ign Syst only—Ignition System only
Int—Internal

Mechanical Specifications

MAKE AND MODEL	GENERAL CHARACTERISTICS							ENGINE						ELECTRICAL SYSTEM						TRANSMISSION					
		Weights			Overall					Horsepower				Ignition				Battery		Clutch	Gearset				
	Type of Car	Total Weight of Car (Lbs.)	Weight on Driving Wheels (Lbs.)	Passenger Capacity	Length, Ft.-Ins.	Width, Ft.-Ins.	Total Number of Wheels	Make	Number of Cylinders, Bore and Stroke (Ins.)	Rated (N.A.C.C.)	Brake	R.P.M. at Normal Track Speed	Location	Make	Current Source	Generator Make	Starter Make	Make	Voltage and Amp. Hrs. Capacity	Make	Type	Make	Number of Forward and Reverse Speeds	Location	Sanders Type
Brill.....55	Spe.	29000	18000	55	43-0	8-4	8	Midw.	4-4 3/4 x6	36.10	68	1600	FinB.	Eise.	M	L-N.	L-N.	Opt.	12-180	B-L.	MDD.	B-L.	6-3	Eng.	Gra.
Edwards.....	Spe.	25000	3000	50	40-0	8-0	8	Midw.	4-4 3/4 x6	36.10	71	1600	FinB.	Eise.	M	West.	West.	Exi	.....	Cot	MDD.	Cot	4-4	SeU	Pre
†F. W. D.....D	CAT.	12000	8000	65	26-0	8-6	8	Wisc.	6-5 x5 1/2	60.00	....	1350	FouB.	N-E.	B.	N-E.	N-E.	Wil	12-225	HeS.	MDO.	Cot	4-4	UwJ	Gra.
F. W. D.....	CAT.	20000	.....	24	21-7	9-6	4	Wisc.	6-5 x5 1/2	60.00	94	1400	FinB.	Eise.	M	N-E.	N-E.	Wil	12-176	HeS.	MDO.	Cot	4-4	SeU	Pre
Indiana.....404	Spe.	23000	13000	65	38-9	9-10	8	Wauk.	4-5 x6 1/4	40.00	60	1400	FouB.	Eisc.	M	Remy	Remy	Wil	6-178	B&B.	SP.	B-L.	4-4	SeU	Pre
M. A. C.....440	Spe.	11000	11000	0	22-6	8-0	4	Buda.	4-4 1/2 x6	32.40	60	1100	FouB.	Bosc.	M	Bosc.	Bosc.	Wil	6-160	B-L.	MDD.	B-L.	4-4	SeU	Pre
Mack.....AH	Spe.	56000	19000	51	55-0	9-9	8	Own.	6-5 1/4 x7	44.10	120	1275	DonT.	Apol.	M	USL	L-N.	Exi	32-240	Own.	MDD.	Own	4-4	SeU	Pre
Mack.....ACX	CAT.	22000	9000	35	35-0	9-9	8	Own.	4-5 x6	40.00	50	1250	FouB.	Spli.	M	L-N.	L-N.	Exi	12-160	Own.	SP.	Own	4-4	SeU	Pre
Mack.....AB	CAT.	12270	7000	30	28-8	8-6	6	Own.	4-4 1/4 x5	28.90	30	1425	FouB.	Spli.	M	L-N.	L-N.	Exi	12-160	Own.	MDD.	Own	4-4	Eng.	Gra.
Meister.....30	Spe.	16000	12000	30	30-0	7-0	6	Midw.	4-4 3/4 x6	36.10	50	1000	RinB.	Bosc.	M	L-N.	L-N.	KCB.	12-120	B-L.	MDD.	B-L.	4-4	Eng.	Pre
Meister 50	Spe.	24300	17500	50	40-0	10-6	8	Wisc.	6-5 3/4 x7	79.35	120	1000	RinB.	Bosc.	M	L-N.	L-N.	Wil	12-120	Del.	MDD.	Own	4-4	Axl	Pre
†White.....SR	CAT.	35000	9000	38	31-6	9-6	6	Own.	4-4 1/4 x5 1/2	28.90	....	1500	FinB.	L-N.	B.	L-N.	L-N.	Wil	12-80	Own	SP.	Own	3-1	Eng.	Gra.

ABBREVIATIONS:
†—1923 Specifications
A&E—Air & Electric
Apol—Apollo
Axl—Unit with Axles
Auto—Automobile Type
B&B—Borg & Beck
B-L—Brown-Lipe
Bosc—Bosch
CAT—Converted Auto Truck
Cha—Chain
Cot—Cotta
C-S—Coil and ½ Elliptic
DE—Double End
Del—Detlaff
DonT—Directly on Trucks
DR—Double Reduction
Eise—Eisemann
Eng—Unit with engine
Exi—Exide
F—Front
FinB—Front Inside Body
FouB—Front Outside Body
F&R—Front and Rear
Gra—Gravity
HeS—Hele Shaw
L-FE—Longitudinal Elliptic
L½E—Longitudinal Semi Elliptic
L-N—Leece-Neville
Man—Manual

of 1924 Electric Cars

TRANSMISSION												WHEELS AND FRAME							MISCELLANEOUS					Weights		Prices		MAKE AND MODEL
Clutch		Gearset				Gear Ratios											Brakes										
Type	Controlled by	Type	Number of Forward Speeds	Reverse Gear Fitted?	Rear Wheel Sprung?	Engine to Gearset	Low	Second	Third	Final Drive Type		Wheelbase (Ins.)	Tire Size (Ins.)	Frame Type	Front Spring Type	Starting System	Foot	Hand	Maximum High Speed (M.P.H.)	Gasoline Tank Capacity (Gals.)	Oil Tank Capacity (Qts.)	Height of Saddle Above Ground (Ins.)	Minimum Road Clearance (Ins.)	Electrically Equipped (Lbs.)	Not Equipped (Lbs.)	Equipped	Not Equipped	
Oil D...	P & HL.	Prog...	3	No..	No..	1.65	11.60	8 13	4.70	Chain.		59½	27x3½	Cradle	HS.	Kick..	Ext...	Yes...	.....	3½	4†	27½	4½	390	360	$375	$345	Ace.....1924
Oil D...	Hand L.	Prog...	2	No..	No..	1.00	9.10	6.30	None..	Chain.		56	26x3	Diam.	HS.	Kick..	Ext...	None..	35	3½	....	27½	5¼	220	210	235	200	Cleveland.....24SE
Dry D..	P&HL..	Fric...	3	No..	No..	1.50	8.00	5.00	3.00	Chain.		52	26x2½	Loop..	HS.	Kick..	Ext...	None..	50	2	2	29	....	220	210	240	200	Emblem.....106
Dry D..	P&GH..	Prog..	3	No..	No..	2.50	11.20	7.60	4.60	Chain.		60	27x3½	Diam.	HS.	Kick..	Ext...	Yes*..	65	2¾	2	27½	5	367	....	310	....	Excelsior.....1924
None...	None...	None..	1	No..	No..	None..	10.10	None..	None..	Belt...		49	28x2	Loop..	HS.	Pedal.	Hub..	None..	30	1½	....	30	6	72	....	140	....	Evans Power Cycle.....G
Dry D..	P&HL..	Prog..	3	No..	No..	2.53	9.77	6.51	4.34	Chain.		60	28x3	Loop..	HS.	Kick..	Ext...	Yes*..	70	3⅛	4	29½	5	387	359	335	315	Harley-Davidson....24FD&JD
Dry D..	P&HL..	Prog..	3	No..	No..	2.69	9.50	6.33	4.68	Chain.		60	28x3	Loop..	HS.	Kick..	Ext...	Yes*..	68	3¼	1	29½	5	381	353	320	300	Harley-Davidson....24FE&JE
Dry D..	P&HL..	Prog..	3	No..	No..	2.53	9.77	6.51	4.34	Chain.		60	28x3	Loop..	HS.	Kick..	Ext...	Yes*..	78	3¼	4	29½	5	385	357	345	325	Harley-Davidson.FDCA&JDCA
Oil D...	P&HL..	Prog..	3	Yes.	No..	1.60	12.00	7.30	4.50	Chain.		60	27x3½	DLoop	HS.	Kick..	Ext...	Int*..	75	4	4†	28½	4½	408	....	398	....	Henderson.....DeLuxe
Oil D...	Pedal...	Prog..	3	No..	No..	2.50	12.05	7.66	4.88	Chain.		54	26 3	DLoop	LS.	Kick..	Int...	None..	55	3	3	29	5	327	....	290	....	Indian.....“G” Scout
Oil D...	Pedal...	Prog..	3	No..	No..	2.57	11.91	7.57	4.82	Chain.		60½	28x3	DLoop	LS.	Kick..	Int...	None..	70	3⅜	4	30	5	425	....	335	....	Indian.....“H” Chief
Oil D...	Pedal...	Prog..	3	No..	No..	2.57	11.30	7.19	4.58	Chain.		60½	28x3	DLoop	LS.	Kick..	Int...	None..	75	3⅜	4	30	5	430	....	348	....	Indian.....Big Chief
Fric....	Gon HB.	Fric...	5	No..	No..	11.50	8.62	7.18	5.75	Chain.		56	26x3	DLoop	HS.	Kick..	Int...	Int*..	35	2	....	29	6	.92	....	210	200	Ner-A-Car.....3 Series
Dry D..	P&HL..	Prog..	3	No..	No..	2.57	10.51	6.86	4.47	Chain.		58	28x3	Diam.	HS.	Kick..	Int...	Ext...	70	3¼	3	28½	5¼	368	358	345	310	Reading Standard.....24RSE
Oil D...	Pedal...	Fric...	2	No..	No..	1.00	9.00	6.00	.....	Chain.		53	26x2¼	Diam.	HS.	Kick..	Ext..	None..	40	1½	¾	28	6	170	165	175	165	Schickel.....T

I.S—Leaf Spring
Mag—Magneto
O G—Mix Oil with Gasoline
Oh I SI E—Overhead Inlet Side Exhaust
Oil D—Oil Disk
O O—Oil Only
Opt—Optional
P & G H—Pedal and Grip on Handle Bars
P & H L—Pedal and Handle Lever
Pist—Piston
Prog—Progessive Sliding
SI by SI—Side by Side
Split—Splitdorf
Sp Pr—Splash with Pressure
Stk—Stock Equipment
Vert—Vertical
*—Optional at extra cost
†—Crank Case capacity

of 1924 Gasoline Rail Cars

DRIVING TRUCK					PONY TRUCK		BRAKES				CONTROL					SPRINGS		BODY DIMENSIONS					MAKE AND MODEL
Location	Wheels		Axle Bearings, Type	Final Drive	Number of Wheels	Axle Bearings, Type	Service		Emergency		Car Control	Transmission				Front Type	Rear Type	Overall		Length			
	Total Number	Number Driving					Type	Application	Type	Application		Throttle	Clutch	Gearshift	Reverse			Inside Length, Ft.-Ins.	Inside Width, Ft.-Ins.	Baggage Compt. Ft.-Ins.	Passenger Compt., Ft.-Ins.	Smoking Compt., Ft.-Ins.	
F.....	4	4	Roll....	SB....	4	Roll....	Rail....	Air.....	Rail....	Air...	DE...	Man..	Man..	Man..	Man..	L-½ E..	L-½ E..	42-0	8-0	Var...	Var...	Var....	Brill.....55
R.....	8	4	.....	Cha...	4	Roll....	Rail....	Air.....	Rail....	Air...	SE...	Man..	Man..	Man..	Man..	L-½ E..	L-½ E..	Var...	Var...	Var...	Var...	Var....	Edwards.....
F&R..	8	4	Roll....	SB....	0	None...	Rail....	Air.....	Auto....	Man..	SE...	Man..	Man..	Man..	Man..	L-FE..	L-FE..	Var...	Var...	Var...	Var...	Var....	†F. W. D.....D
R.....	4	4	Roll....	SB....	0	None...	Rail....	Air.....	Rail....	Air...	SE...	Man..	Man..	Man..	Man..	L-½ E..	L-½ E..	Var...	Var...	Var...	Var...	Var....	F. W. D.....
R.....	4	4	Ball....	Wo....	4	Plai.....	Rail....	Air.....	Rail....	Air...	SE...	Man..	Man..	Man..	Man..	L-FE..	L-FE..	31-2	9-2	Var...	Var...	Var....	Indiana.....404
F&R..	4	4	Roll....	SB....	0	None...	Rail....	Air.....	Rail....	Air...	SE...	Man..	Man..	Man..	Man..	L-½ E..	L-½ E..	22-6	8-0	Var...	Var...	Var....	M. A. C.....440
F.....	4	2	Roll....	SB....	4	Roll....	Rail....	Air.....	Rail....	Air...	DE...	A&E..	A&E..	A&E..	A&E..	L-½ E..	L-½ E..	54-0	9-3	13-9	29-5	8-6	Mack.....AH
R.....	4	2	Roll....	DR....	4	Roll....	Rail....	Air.....	Rail....	Man..	SE...	Man..	Man..	Man..	Man..	L-½ E..	L-½ E..	27-6	9-3	6-0	21-4	None...	Mack.....ACX
R.....	2	2	Roll....	DR....	4	Roll....	Auto....	Man.....	Auto....	Man..	SE...	Man..	Man..	Man..	Man..	L-½ E..	L-½ E..	21-9	7-3	Var...	Var...	Var....	Mack.....AB
R.....	2	2	Ball....	SB....	4	Ball....	Rail....	Man.....	Rail....	Man..	SE...	Man..	Man..	Man..	Man..	Rub....	C-S.....	30-0	6-6	6-6	19-0	6-6	Meister.....30
R.....	4	2	Ball....	SB....	4	Ball....	Rail....	Air.....	Rail....	Man..	SE...	Man..	Man..	Man..	Man..	Rub....	C-S.....	39-6	10-0	10-0	30-0	None...	Meister.....50
R.....	2	2	Ball....	DR....	4	Plai.....	Auto....	Man.....	Rail....	Man..	SE...	Man..	Man..	Man..	Man	L-½ E..	C-½ E..	.....	.....	.....	.....	.....	†White.....SR

MDD—Multiple Dry Disk
MDO—Multiple Disk in Oil
Midw—Midwest
N-E—North East
Opt—Optional
Plai—Plain
Pre—Pressure
R—Rear
Rail—Railroad Type
RinB—Rear inside Body
Roll—Roller
Rub—Rubber
SB—Spiral Bevel
SE—Single End
SeU—Separate Unit
SP—Single Plate
Spe—Special Railroad Design
SpII—Splitdorf
UwJ—Unit with Jackshaft
Var—Varies
Wil—Willard
Wauk—Waukesha
Wisc—Wisconsin
Wo—Worm

Four States Have More Than 1,000,000 Automobiles Each

1923 Registration Was 15,281,295 Cars and Trucks, a Gain of 23.6 Per Cent Over the Registration for 1922

THERE are 15,281,295 motor cars and trucks registered in the United States, according to the figures compiled up to Dec. 31, 1923.

This high mark is 2,916,918 ahead of the total reached in 1922, a gain of 23.6 per cent. There now is one car for every 7.2 persons in the country. The taxes and fees paid to the State treasuries last year by car and truck owners amounts to $190,000,000.

The relation between car and truck registration remains practically the same as last year, commercial vehicles comprising about 11 per cent of the total. Tremendous strides have been made in registrations since July 1, as the mid-year total topped the 1922 figures by only 683,751.

The very late fall probably stimulated buying materially, resulting in an unusually large number of cars going into service in the last half of the year. This movement was given greater impetus by the introduction of many entirely new models in preparation for the 1924 selling season.

Four states now boast a motor vehicle population in excess of 1,000,000. One year ago New York was the only commonwealth which had passed this mark. California, Ohio and Pennsylvania are the other three States which have entered the charmed circle. All parts of the country have contributed materially to the new record, registration gains ranging all the way from 3053 in Nevada up to 234,888 in Pennsylvania.

No major changes have taken place in the order of the states listed according to registration totals. Only one shift has taken place in the first ten, Indiana having slipped ahead of Iowa and taken eighth position. At the other end of the ladder a similar condition prevails. Utah, which last year was eighth from the bottom, has passed Idaho and moved up one peg. Otherwise the last ten on the list remain in the positions they occupied twelve months ago.

The striking character of the 1923 figures can be understood when it is realized that the percentage gain over the previous year is greater than at any other time since 1919. The actual gain, of course, is far ahead of any ever recorded in the history of the industry. The percentage increase is remarkable because a constantly decreasing rate of growth was to be expected as the actual totals mounted.

Several possible explanations of the tremendous increase have been given above, but the upward movement has been so much greater than anyone expected that the phenomena will be a subject for interesting speculation and discussion for some time to come.

Southern states again contributed the largest percentage gains in registrations, seven of the first ten in the percentage list being in this group. Rhode Island, the leader, shows an increase over last year of 76 per cent. This figure is so high as to render doubtful its accuracy, despite the fact that the information concerning this state was obtained from the most accurate data available at this time.

The automotive progress of the South is emphasized further by the fact that Georgia, which had the lowest percentage gain of any of the states below the Mason-Dixon line, forged ahead of its 1922 total by 19.4 per cent.

Industrial states had smaller percentage gains than did the southern group, but the bottom rungs of the percentage ladder are held by the agricultural areas. Reading from the bottom up, the following states appear: South Dakota, North Dakota, Nebraska, Iowa, Missouri and Kansas. In each of these cases, however, the gain was greater than that recorded a year ago.

The list of percentage gains reflects rather accurately what might have been expected in automobile sales as a result of the economic condition of the country during the past twelve months. 1923 has

Registration of Motor Vehicles

States	Total Registration of Cars and Trucks	Passenger Cars	Trucks	Motor-cycles	Total Fees
Alabama	126,642	112,797	13,845	599	$ 1,532,614
Arizona	48,386	41,852	6,534	388	281,584
Arkansas	111,946	100,758	11,188	300	1,698,000
California	1,093,660	1,050,265	43,395	14,654	10,548,386
Colorado	189,500	176,000	13,500	2,500	1,125,500
Connecticut	191,647	156,747	34,900	2,500	4,329,269
Delaware	29,500	24,000	5,500	400	625,000
District of Columbia	103,171	94,787	8,384	2,510	445,712
Florida	160,000	130,000	30,000	1,200	1,963,000
Georgia	173,794	151,325	22,469	1,011	2,156,406
Idaho	62,350	56,950	5,400	670	913,440
Illinois	969,092	847,005	122,087	7,612	9,653,795
Indiana	582,882	509,821	73,061	5,000	3,993,699
Iowa	572,611	536,296	36,315	3,034	8,825,962
Kansas	375,594	349,038	26,556	1,950	203,158
Kentucky	196,110	175,869	20,241	1,014	2,680,580
Louisiana	138,500	117,500	21,000	350	2,200,000
Maine	106,847	91,055	15,792	1,558	1,659,349
Maryland	206,450	193,850	12,600	4,850	3,452,720
Massachusetts	566,150	482,645	83,505	11,733	6,989,633
Michigan	728,327	655,017	73,310	4,163	8,845,575
Minnesota	448,187	399,404	48,783	3,220	7,244,490
Mississippi	103,850	93,850	10,000	114	1,166,923
Missouri	450,800	405,720	45,080	2,000	4,800,000
Montana	73,827	65,448	8,379	374	729,678
Nebraska	285,488	258,941	26,547	1,605	3,350,640
Nevada	15,700	12,400	3,300	90	155,000
New Hampshire	59,571	52,583	6,988	1,987	1,447,000
New Jersey	418,212	329,534	88,678	8,779	7,927,439
New Mexico	31,737	28,564	3,173	172	280,000
New York	1,214,090	966,116	247,974	22,981	19,858,572
North Carolina	247,700	226,500	21,200	1,300	6,642,503
North Dakota	109,244	105,957	3,287	645	760,444
Ohio	1,072,750	924,832	147,918	15,300	9,500,000
Oklahoma	307,000	288,424	18,576	823	3,380,000
Oregon	166,403	152,967	13,436	3,140	4,069,550
Pennsylvania	1,064,625	899,697	164,928	19,817	15,828,494
Rhode Island	116,940	93,303	23,637	1,800	1,440,257
South Carolina	128,656	116,537	12,119	561	902,608
South Dakota	131,707	121,152	10,555	466	2,000,000
Tennessee	165,000	146,500	18,500	800	2,200,000
Texas	688,899	618,208	70,691	3,346	5,647,663
Utah	66,025	57,460	8,565	766	834,225
Vermont	52,776	49,420	3,356	839	938,860
Virginia	217,200	188,200	29,000	1,800	2,500,000
Washington	258,264	221,164	37,100	3,560	4,200,000
West Virginia	157,926	150,472	7,454	1,353	2,608,508
Wisconsin	455,714	422,714	33,000	5,643	4,968,053
Wyoming	39,845	35,295	4,550	291	415,000
Total	15,281,295	13,484,939	1,796,356	171,568	$189,919,289

Motor Vehicle Registration 1912 to 1923

	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923
Alabama	8,078	11,925	21,636	32,873	46,171	58,898	74,637	82,343	90,052	126,642
Arizona	5,040	7,318	12,124	19,890	23,905	28,979	34,559	35,049	38,034	48,386
Arkansas	5,642	8,021	15,000	28,693	41,458	49,450	59,082	67,446	86,425	111,946
California	123,516	163,795	232,440	306,916	364,800	477,450	568,892	673,830	861,806	1,093,660
Colorado	17,756	27,568	43,296	66,850	83,630	104,865	128,951	145,739	162,328	189,500
Connecticut	33,009	43,985	61,855	85,724	92,606	109,651	119,134	137,526	154,675	191,647
Delaware	3,050	4,657	7,102	10,700	12,955	16,152	18,300	21,413	24,560	29,500
Dist. of Columbia	4,833	8,009	13,118	15,493	30,490	35,400	39,712	61,745	85,425	103,171
Florida	3,368	10,850	20,718	27,000	54,186	55,400	73,914	97,837	115,891	160,000
Georgia	20,916	25,671	47,579	70,357	99,800	127,326	144,422	131,942	145,584	173,794
Idaho	3,346	7,071	12,999	24,731	32,289	42,220	50,873	51,264	53,874	62,350
Illinois	131,140	180,832	248,429	340,292	389,620	478,438	568,759	670,434	786,190	969,092
Indiana	66,400	96,915	139,317	192,192	227,160	277,255	332,707	400,342	469,939	582,882
Iowa	112,134	152,134	198,602	254,317	278,313	363,857	437,300	460,528	500,148	572,611
Kansas	49,374	72,520	112,122	159,343	189,163	227,752	265,396	291,309	327,194	375,594
Kentucky	11,746	19,500	31,700	47,416	65,870	90,641	112,685	126,371	154,021	196,110
Louisiana	12,000	11,380	17,000	28,394	40,000	51,000	66,000	80,500	102,284	138,500
Maine	15,700	21,545	30,972	41,499	40,372	53,425	62,907	77,527	92,539	106,847
Maryland	20,213	31,047	44,245	60,943	74,666	95,634	116,341	140,572	165,624	206,450
Massachusetts	77,246	102,633	136,809	174,274	193,497	247,183	304,631	360,732	449,838	566,150
Michigan	76,389	114,845	160,052	247,006	262,125	325,813	412,717	477,037	578,980	728,327
Minnesota	67,862	93,269	46,000	54,009	204,458	259,743	309,569	328,700	380,557	448,187
Mississippi	5,964	9,669	25,000	36,600	48,400	45,030	63,484	65,139	77,001	103,850
Missouri	54,468	76,462	103,587	147,528	188,040	244,363	296,919	346,437	392,969	450,800
Montana	10,172	14,499	24,440	42,696	51,037	59,325	60,646	58,785	62,649	73,827
Nebraska	40,929	59,140	100,534	148,101	175,409	192,000	223,000	238,704	256,654	285,488
Nevada	1,487	2,009	4,919	7,160	8,159	9,305	10,464	10,819	12,647	15,700
New Hampshire	9,571	13,499	17,588	22,267	24,817	31,625	34,680	42,039	48,293	59,571
New Jersey	60,247	78,232	104,341	134,964	155,519	190,873	227,737	272,994	341,626	418,212
New Mexico	2,945	5,100	8,228	9,457	15,000	18,077	22,109	24,703	25,473	31,737
New York	169,966	234,032	317,866	411,567	463,758	571,662	669,290	812,031	1,002,293	1,214,090
North Carolina	14,677	21,000	33,904	55,950	72,313	109,017	140,860	148,684	182,550	247,700
North Dakota	15,701	24,908	40,446	62,993	71,627	82,885	90,840	92,644	99,052	109,244
Ohio	122,504	181,332	252,431	346,772	412,775	511,031	615,397	720,632	859,504	1,072,750
Oklahoma	13,500	25,032	52,718	100,199	121,500	144,500	204,300	221,300	249,659	307,000
Oregon	16,447	23,585	33,917	48,632	63,324	83,332	103,790	118,325	134,299	166,403
Pennsylvania	112,854	160,137	230,578	325,153	394,186	482,117	570,164	689,569	829,737	1,064,625
Rhode Island	12,331	16,362	21,406	37,046	36,218	44,833	50,375	54,957	66,466	116,940
South Carolina	14,500	15,000	19,000	39,527	55,492	70,143	92,818	90,546	95,978	128,656
South Dakota	20,929	28,784	44,271	67,158	90,521	104,628	120,395	119,274	125,238	131,707
Tennessee	19,769	22,738	30,000	48,000	63,000	80,422	101,852	117,025	135,716	165,000
Texas	64,732	90,000	197,687	213,334	251,118	331,310	427,693	467,616	526,238	688,899
Utah	2,253	9,177	13,507	24,076	32,273	35,236	42,578	47,523	49,156	66,025
Vermont	8,256	11,499	15,671	20,369	22,655	26,807	31,625	36,965	43,881	52,776
Virginia	14,002	21,357	35,426	55,000	72,228	94,120	134,000	141,000	169,000	217,200
Washington	30,253	38,823	60,734	91,337	117,278	148,775	*173,920	185,359	220,957	258,264
West Virginia	6,159	13,279	20,571	31,300	38,750	50,203	78,862	93,894	112,763	157,926
Wisconsin	53,161	79,791	115,637	164,531	196,844	236,981	293,298	341,841	388,044	455,714
Wyoming	2,428	3,976	7,125	12,523	16,200	21,371	23,926	26,619	30,637	39,845
Totals	1,768,963	2,494,912	3,584,567	4,992,152	6,105,974	7,596,503	9,206,510	10,505,630	12,364,377	15,281,295

been a period of prosperity throughout the South and marked progress has been made in all lines. Manufacturing areas, too, have been in good condition, but the very large number of vehicles already in these places naturally would keep percentage increases down. The farmer has had more economic difficulties than anyone else and his relatively low buying power is reflected in the figures.

Nevertheless the fact remains that very substantial gains in car and truck use have been made in every section of the United States and that the registration figures justify abundantly the huge production of 1923. The cars were needed and they were bought.

Nine states put into operation more than 100,000 vehicles in addition to those used in 1922, while only seven failed to show a gain in excess of 10,000.

Trucks comprise a far more important part of total vehicle registration in some states than in others. A striking contrast, for example, is shown between the relative proportions of passenger and commercial vehicles in New York and California, the two leading states.

California, although second in total number of motor vehicles, leads in number of passenger cars by some 84,000, being the only state to register more than 1,000,000 vehicles of this type. In the New York figures, motor buses have been counted as trucks and taxicabs as passenger cars.

A real need for uniformity in registration methods still exists, as it has in the past. Practice in individual states is constantly improving, and the intelligence and accuracy with which registration data are compiled is increasing every year. Individual advance, however, has not facilitated in any way the difficulty of properly and accurately combining the registration data gathered from the forty-eight states. There is no uniformity of nomenclature or definition of terms so far as the various states are concerned. Each is literally a law unto itself and registration information, accurate as to detail, can be obtained only at the cost of persistent effort and careful study of constantly changing methods.

Fifteen times as many cars and trucks are registered in the United States today as there were in 1912; about twice as many as in 1919. The relatively great size of this year's increase is made clear by the following list, which shows the increase in registrations each year since 1913:

1913	237,657
1914	520,907
1915	725,949
1916	1,089,655
1917	1,407,585
1918	1,113,822
1919	1,490,529
1920	1,610,007
1921	1,299,120
1922	1,858,747
1923	2,916,918

Fees paid by motorists increased last year more rapidly than did the number of vehicles put into operation. With final figures not yet in, 1923 automobile fees top the 1922 total by $49,000.

Registration of Cars and Trucks, December 31, 1923

New York	1,214,090
California	1,093,660
Ohio	1,072,750
Pennsylvania	1,064,625
Illinois	969,092
Michigan	728,327
Texas	688,899
Indiana	582,882
Iowa	572,611
Massachusetts	566,150
Wisconsin	455,714
Missouri	450,800
Minnesota	448,187
New Jersey	418,212
Kansas	375,594
Oklahoma	307,000
Nebraska	285,488
Washington	258,264
North Carolina	247,700
Virginia	217,200
Maryland	206,450
Kentucky	196,110
Connecticut	191,647
Colorado	189,500
Georgia	173,794
Oregon	166,403
Tennessee	165,000
Florida	160,000
West Virginia	157,926
Louisiana	138,500
South Dakota	131,707
South Carolina	128,656
Alabama	126,642
Rhode Island	116,940
Arkansas	111,946
North Dakota	109,244
Maine	106,847
Mississippi	103,850
District of Columbia	103,171
Montana	73,827
Utah	66,025
Idaho	62,350
New Hampshire	59,571
Vermont	52,776
Arizona	48,386
Wyoming	39,845
New Mexico	31,737
Delaware	29,500
Nevada	15,700
Total	15,281,295

Percentage Gains in Registration, 1922-1923

State	Per Cent
Rhode Island	76.0
Alabama	40.6
West Virginia	40.1
Florida	38.2
North Carolina	35.6
Louisiana	35.6
Mississippi	34.6
South Carolina	34.0
Utah	34.3
Michigan	33.2
Texas	30.9
Wyoming	30.0
Arkansas	29.6
Virginia	28.5
Pennsylvania	28.3
Kentucky	27.3
Arizona	27.2
California	26.8
Massachusetts	25.9
Ohio	24.8
Maryland	24.7
New Mexico	24.6
Nevada	24.2
Indiana	24.0
Oregon	23.9
Connecticut	23.9
New Hampshire	23.4
Illinois	23.2
Oklahoma	23.0
New Jersey	22.4
Tennessee	21.5
New York	21.1
District of Columbia	20.8
Vermont	20.3
Delaware	20.1
Georgia	19.4
Montana	17.8
Minnesota	17.7
Wisconsin	17.4
Washington	16.9
Colorado	16.7
Idaho	15.7
Maine	15.5
Kansas	14.7
Missouri	14.7
Iowa	14.5
Nebraska	11.2
North Dakota	10.3
South Dakota	5.1
United States	23.6

Service Is the Magic Wand in Klepfers' Growing Business

Three Former Mechanics Erect Fine Building and Great Salesroom as Monument to Mechanic's Ability to Build a Business Without Usual Sales Corps

"THE fact that we have been able to build up the largest retail automobile business in Buffalo **without employing salesmen** is due, I believe, largely to the continuous boosting we received from those who have bought cars from us and who have been pleased with the automobiles and the service we give," said Matt Klepfer.

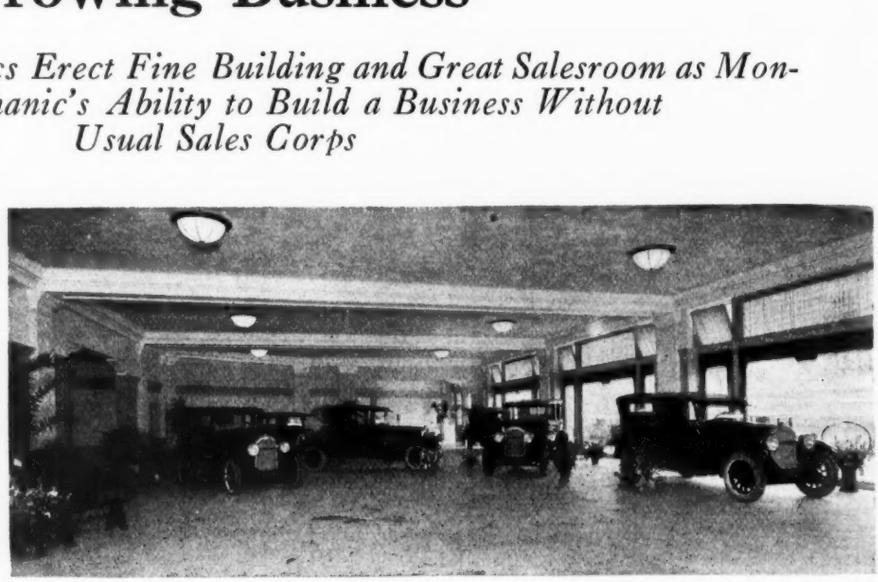
This noteworthy achievement of Klepfer Brothers, Buick dealers in Buffalo, is attested by the new home of the company, one of the largest and finest establishments devoted exclusively to retail automotive merchandising.

This building, which has just been completed, faces Main street, near Ferry street and backs on Michigan avenue. It is 307 ft. deep, 125 ft. wide and two stories high. It contains 62,500 sq. ft. of floor space. The structure is lighted on all sides by courts and streets. It has no elevators. Cars ascend to and descend from the upper floor by means of a ramp system. On the lower floor in front is the salesroom for new cars. It has 6500 sq. ft. of floor room. Over it and corresponding in size is a salesroom for used cars.

In the rear on the ground floor is a service station for light repairs and over it one for heavy repairs. In each there is room for 47 cars to be worked on at the same time.

Employes Well Provided For

There are no dark corners in the plant. On each floor there are shower baths, lockers and private dressing rooms for the employes. The building is occupied exclusively by the Klepfers for Buick sales and service. It is of brick and steel construction.



The new car salesroom, on the first floor has a floor space of 6,500 sq. ft. Over it is a used car salesroom of equal size

A Modest Beginning

Since moving into their fine new home the Klepfers have received many felicitations on this latest evidence of the great success that is rewarding their efforts. They started in business 28 years ago when they opened a bicycle store and repair shop in a modest frame building in Depew, near Buffalo. This later became an automobile sale and repair business. They moved to Buffalo eight years ago and the expansion of their business since then has been remarkable.

The success of Klepfer Brothers is the result of several causes, among them their comprehensive mechanical knowledge of the automobile, their gluttony for work, their insistence on doing it themselves instead of delegating it to subordinates; their strong belief that every favor done is "bread cast upon the waters," their rigid adherence to the square deal, their constant utilization of the golden rule and their knowledge of humanity that prompts them to use courtesy, when courtesy is appreciated and sterner stuff when dealing with those on whom courtesy would be wasted.

All Expert Mechanics

Each of the three brothers in the firm knows all about the "innards" of an automobile. This knowledge is the result of years of personal experience gained when they did, car repairing and nothing else, and later when repairing was the major, and selling cars the minor, source of their income. This enables them to diagnose quickly and correctly even the most baffling of the ills the automobile is heir to, thus saving time and labor in locating troubles, for which others, less skilled, might search hours, even days.

How this knowledge is applied was illustrated by an incident that happened recently. A customer brought a car to their establishment. Its engine had developed some ailment. The car was turned over to one of the mechanics. He was unable to discover the nature of its trouble. The head of the service department was put on the job. The mysterious "sickness" of the car puzzled even him. The attention of Frank Klepfer was directed to the problem. He drove the machine around the block. "Loose fly wheel," he said laconically when he returned.

They are great workers, these Klep-

Klepfer Bros. new building is the home of the largest retail automobile business in Buffalo

fers. Frank Klepfer has not taken a vacation in 30 years. Matt hasn't had one in 14 years. No golf, no baseball, no fishing for them. Work is their recreation. They are the first to arrive in the morning at "the shop," as they call their magnificent new salesroom and service station, and the last ones to quit at night. And they STAY THERE ALL DAY. When a prospect comes in to buy a car or an owner brings his car in to have it repaired, he can, if he wishes to, talk to the boss instead of to some subordinate. The Klepfers have found that it pays to make it possible for customers to TALK TO THE BOSS.

Customers Talk to the Boss

"You'd hardly believe it," said Matt Klepfer, "but lots of persons would rather pay a dollar more for an inner tube bought from one of the firm than to save the dollar and buy the tube from some subordinate.

"Whether they are buying automobiles, neckties, rubbers, firecrackers or dill pickles, people, men especially, like to deal with THE BOSS." Klepfer continued. "It pleases, I might say flatters, the average person to have a member of the firm greet him when he comes in to look at a new or used car or to have his machine repaired.

"It is easier for the boss to convince a prospect that the car he is selling is the car the prospect should buy. He places more credence in what the boss says than he does in what some salesman might tell him. He discounts what the salesman says because he figures that if he goes into another shop a week hence the same salesman may be there ready to tell him that the car he is then selling is the greatest one on earth, the same thing he claimed for the other car.

The Boss Has More at Stake

"And when it comes to adjusting grievances, it pays for the boss to be around. Better than any salesman a member of the firm can soothe the wrath of the owner who comes in with blood in his eye and vitriol in his voice when his car has acted up. The boss will go to further lengths to dissipate the caller's anger than any hireling will. Why? Because the boss has more at stake than any subordinate has. He knows that if he sends the offended man away dissatisfied he lets loose a walking, talking liability whose 'curses' will come home to the dealer to roost.

In the rear of the ground floor is a service room for light repairs and over it one for heavy repairs. In each there is room to work on 47 cars at a time

"The boss will seek harder than an employe for evidence to convince the owner that something other than the car itself was to blame for its misbehavior; that dirty gasoline from the bottom of an ill-kept tank or something of the kind caused it to stop. If it was the fault of the car itself he should say so frankly. He should assume all the cost of the work that is done on the car if that be necessary to put the owner in good humor."

The Value of Making Friends

The next best thing to preventing enmities, the Klepfer brothers say, is to make friends. They attribute their success largely to the fact that they have never let slip an occasion to do someone a favor. They do not confine these good works to their customers, actual or potential. They are ready to do a good turn for anyone.

The service department of the Klepfer brothers has been a strong factor in building up their business because their mechanical knowledge of cars, especially of the Buick, enables them to know, for instance, just about how long any repair job should take. If a charge for 12 hours work is made on a job which a member of this firm believes could have been done in four hours, an investigation is made to find out what was done in the other eight hours.

If it is found that the mechanic simply fiddled away the time, the car's owner is charged for but four hours and the mechanic is reduced to the rank of a helper. If it is discovered that the delay was due to hard luck encountered by the mechanic—breaking of tools, etc., the owner of the car is charged for four hours only.

When the repair job requires but little time or material, no charge is made. All charges made are placed as low as is consistent with good work and the use of authorized Buick parts.

They Stress Promptness

The firm lays great stress on getting repair jobs done when promised. The Klepfers believe in treating every person with whom they come into contact honestly and squarely regardless of his rank or walk in life. Such is the reputation of this firm for square dealing, the insurance companies do not, themselves, appraise repair jobs done by the Klepfers on cars injured in collisions, etc. They accept the bills of Klepfer Brothers, as rendered.

The Klepfers believe in courtesy when it is extended to persons who understand and appreciate courtesy but they also understand that persons must be handled according to their varying temperaments.

"All sorts of people," said Frank Klepfer, "come to a place like ours, persons with different natures, different temperaments. You have to figure out in your own mind how each one should be handled and treat him accordingly."

Against Discriminatory Laws

ALABAMA dealers, under the leadership of Birmingham Motor Trade Association, are up in arms against what are regarded as discriminatory tax measures passed at the last session of the legislature. One that has caused particular resentment requires an applicant for a license to prove that taxes on the car for the preceding year have been paid, a feat which is often difficult in the case of a used car which may have had a number of owners.

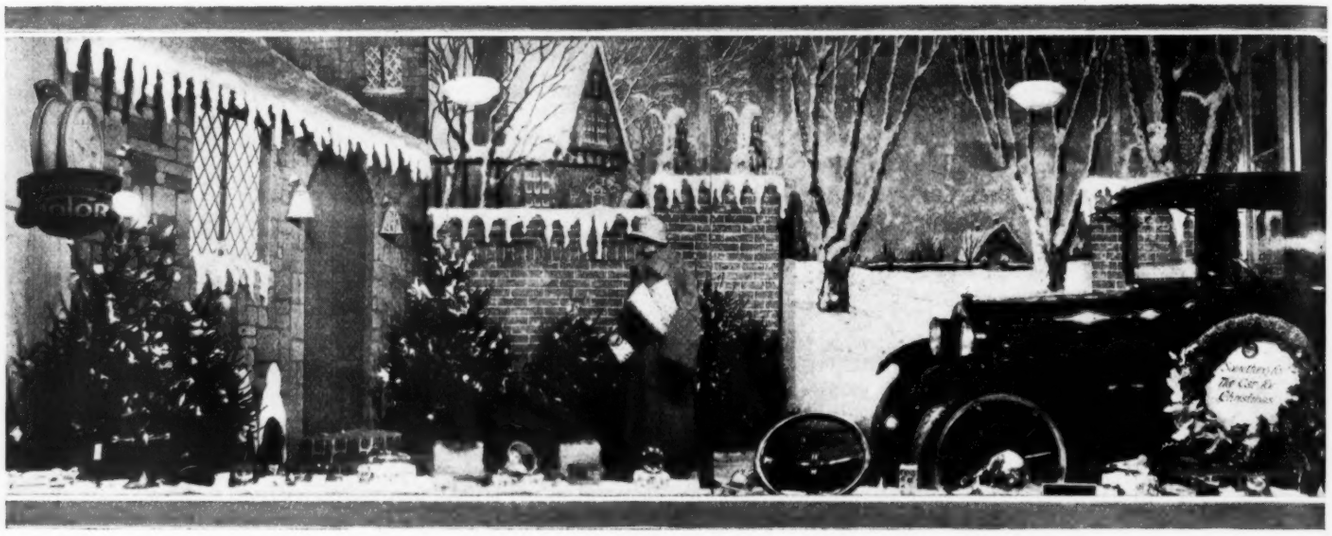
All used cars now in the hands of dealers on which tax for the previous year has been levied are sold subject to a tax lien. The position of the dealers is that the automobile has been singled out from all other personal property and that the law is unfair from this viewpoint.

Another legislative provision which has aroused the ire of the dealers is that requiring applicants for automobile licenses to pay a fee of $1 to the police on each change of title.

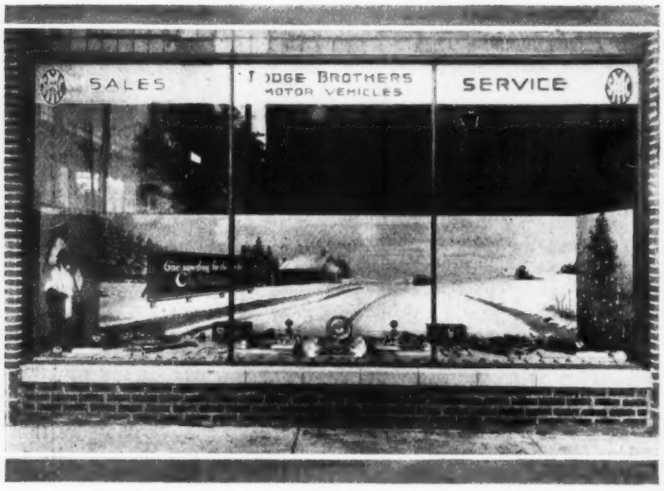
This law was the outcome of an effort on the part of automotive interests to secure the enactment of a bill to protect titles and to reduce the cost of theft insurance which had become prohibitive. It had been intended to require applicants to prove title by means of a bill of sale subject to the approval of the probate judge but there was to be no fee for this. A lack of uniformity in the construction placed upon the law has served further to complicate the situation by demanding payment of the fee even in the case of sale of a new car where no question of validity of title is involved.

Concerted effort to secure the repeal or modification of the objectionable laws is planned.

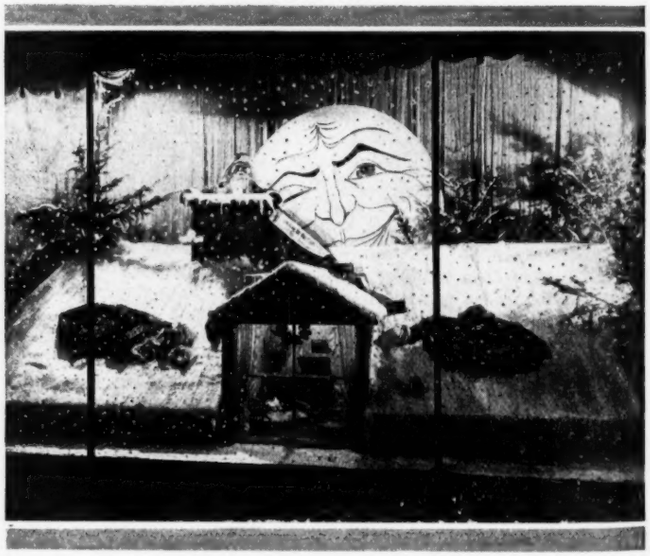
Prize Winning Windows in the A. E. A. Contest



Gorrell Motor Corp., Zanesville, O., won first prize in the A. E. A. contest with this appealing winter scene

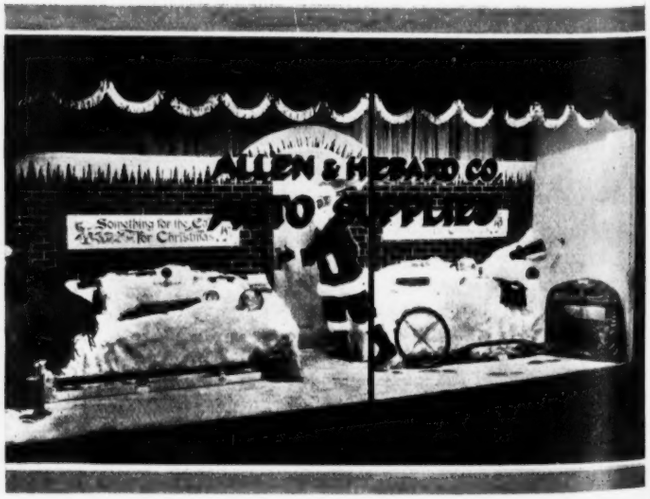


Standard Motor Car Co., Baton Rouge, La., scored second place presenting this simple background



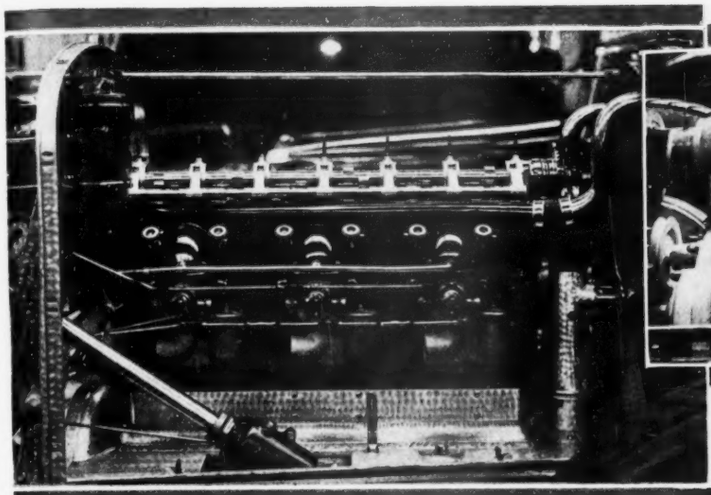
H. L. Arnold, Inc., Los Angeles, featured Santa Claus, the moon and a house top for third prize

Henshaw Motor Co., Boston, went in for this typical Christmas home and won fourth prize

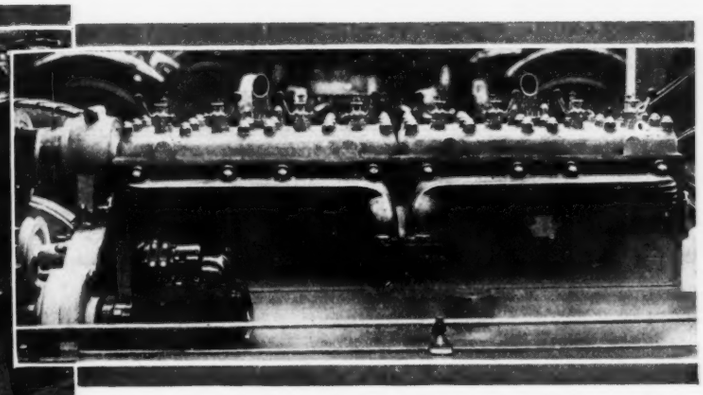


Allen & Hebard Co., Portland, Ore., combined an accessory display with a true Christmas window for fifth prize

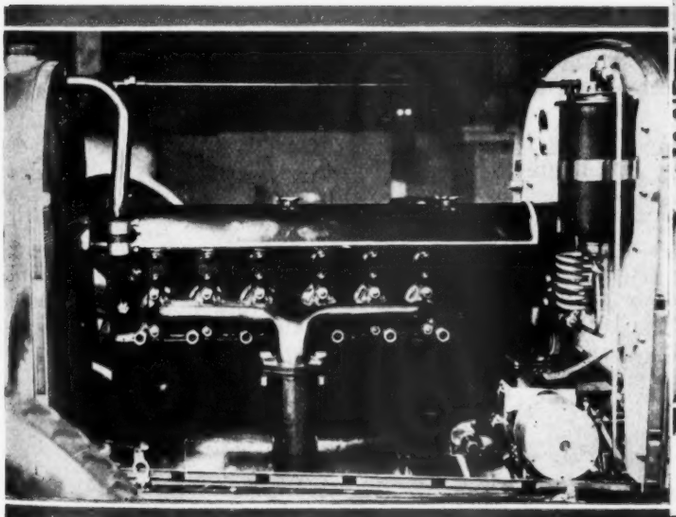
Six Interesting European Engines At the Belgian Show



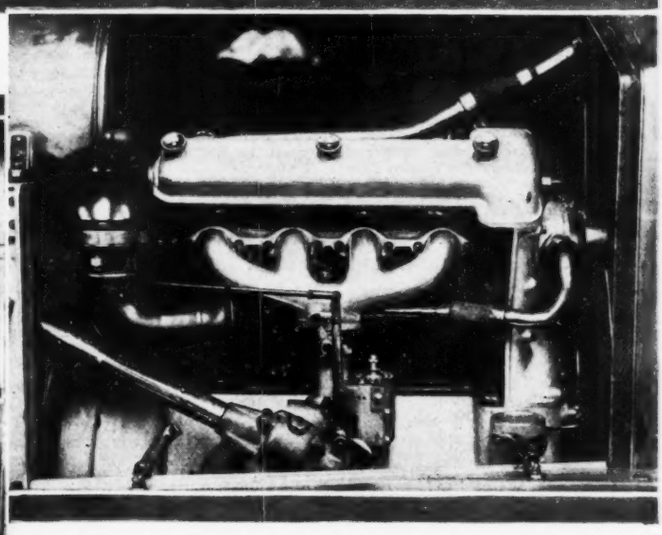
The Excelsior six-cylinder engine which has a carbureter for each two cylinders. The camshaft is overhead



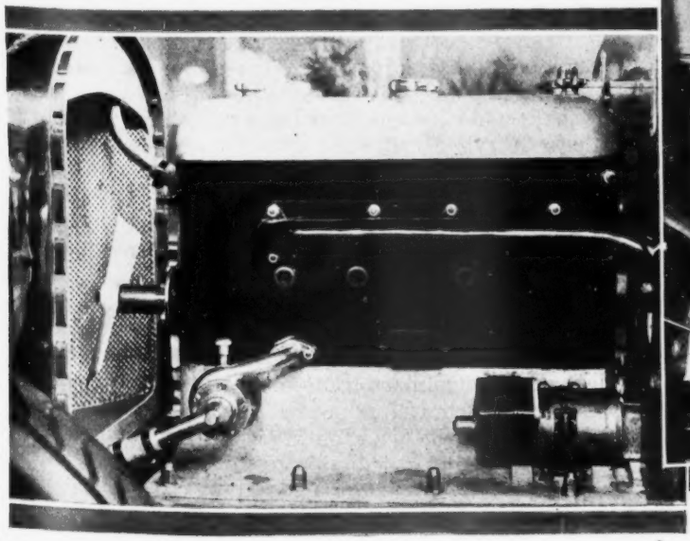
The eight-in-line Dunamis, a good example of clean engine design. This is the exhaust side



Austro-Daimler six-cylinder. This engine also has an overhead camshaft



This is the 91-cubic inch Italian Chiribiri engine developing 70 hp. Another view is at the lower left



The four-cylinder Darse engine. Note the short control levers

MOTOR AGE

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Congressmen and Brake Linings

THE United States Bureau of Standards states that it has no funds to continue its experimental tests of the efficiency and durability of automobile brake lining materials. Commissioner A. A. Mowbray of the Asbestos Brake Lining Association announced, at a recent meeting of his organization in New York, that he had been so advised by the Department of Commerce under which the Bureau of Standards operates.

It is too bad that this Governmental agency is forced to give up a work of such great importance to the safety of millions of persons who motor and who walk. It is recognized that the experiments of the Bureau already have led to great progress in the development of brake lining matrials which could be depended upon to perform their intended function of stopping the car and stopping it surely. It is important that in brake linings there should be a uniformity of friction action which under equal conditions will always act the same. This is the safety factor.

There is also the economic factor of reducing operation cost by making it necessary to renew brake linings less frequently. Braking elements are bound to wear, but a material which wears little while delivering the service expected of it is preferred to one which wears much. Along this line the Bureau of Standards already has rendered valuable service and if its experiments and tests could be continued it undoubtedly would make still further progress.

So that is why the great automotive industry feels that Congress ought to be a little more liberal with the Bureau of Standards and give it another appropriation sufficient to carry on this good work. If every Congressman, your own included, could be made thoroughly familiar with these facts, it is undoubtedly true that all of them would vote for such an appropriation.

What have you done about automotive taxes?

Specifications and Trends

AGAIN MOTOR AGE has collected specifications in great variety and detail on all makes of motor vehicles and presents them in this issue for the benefit of the industry. That part of the industry engaged in the maintenance of motor vehicles will find in these pages a wealth of information in a conveniently accessible form. The selling part of the industry—and it has a close relationship to the maintenance part—likewise will find here information of great value.

The facts have been gathered with painstaking care and every effort has been made to have them as complete and accurate as is humanly possible. They cover a period extending back as far as it was thought would be necessary to include the great majority of motor vehicles now in operation, but readers who have occasion to look for specifications of cars of still earlier years will find them in the 1923 Annual Show and Specification Number of MOTOR AGE.

In connection with the specifications MOTOR AGE is presenting this week several extensive studies of the latest developments in motor car construction, with special reference to bodies, power plants, electrical systems and all-round reliability. The serious minded automotive merchant who sells maintenance as a commodity will find it fully as profitable to him to study these developments which indicate trends in the industry as to file the specifications tables for future reference.

Sane traffic regulation is up to the industry.

Painting and Retrimming

DURING the next three or four months many thousands of good, hard dollars, many hundreds of thousands of real, profit-producing dollars, will pass from the pockets of automobile owners into the cash registers or overall pockets of thousands of proprietors of small paint shops and carriage trimming establishments throughout the country. Most of this money unquestionably could be and all of it, we like to believe, should be added to the gross income of those who are connected directly, in one way or another, with the automobile business. It could and should go to automotive dealers and automotive service men. It will not.

But a lot of money, will. Whether it is as much or more, is for the moment beside the question. A lot of money will go to progressive owners and operators of modern departmentalized transportation establishments for repainting and refinishing, inside and out, cars which have passed through their hands on the way from manufacturer to owner. Some of it will also go to the fellows who run smaller shops and have been able to prove to their possible

customers that they are competent and can be depended upon to do satisfactory jobs of this kind.

All of this work and the money that goes with it will or should make business better for those who get it in the only way it is worth while to have business better, which is to have it yield bigger profits. If, in any individual case it does not, that is another matter which has been discussed in these pages under other headings for many years and is not the subject of this editorial.

The purpose of these few words is to direct one more message on neglected opportunity to the man who undeniably could cash in on the great spring cleanup of the automobile industry, but isn't going to.

Who is that man? Isn't he the distributor or fair sized dealer in the county seat or other large town who has seen a few hundred cars pass through his hands and yet hasn't seen that someone else is making a living at least out of putting new paint on them when they go through that more or less major operation? He is.

Whether Bill Spriggins of Katswanis, Kekk County, the home of 568 Katswanisites, according to the latest census, should build for himself a paint shop as an addition to his remodelled barn is not now up for discussion and is not being discussed. There might be an argument about that and it is admitted that in Bill's case it is likely true that "it all depends."

But about the other fellow, he in the center of some real population (and the word real refers to quantity and not to quality), about this fellow there can be no doubt. He can paint automobiles and retrim automobiles as well as anyone by equipping himself to do so. There are many like him from whose example he can profit. If he doesn't know how to go about it, he can easily learn.

The repainting and retrimming of automobiles is rightfully and logically a part of the automobile business. It is just as logically a part of the automobile business as carriage painting was a part of the business of carriage selling and repairing. Have we so soon forgotten—we have not, of course, for he is still with us to some extent—the chap of less than a generation ago who had a blacksmith shop on the ground floor and a carriage repair shop and a paint shop on the floor above? He was departmentalized. He was a blacksmith and a carriage man and he painted and retrimmed carriages. He was the man to do it just as the automobile man of today is the one to paint and retrim the automobile. Many now do it. More will do it later.

In time of winter prepare for spring—business.

An Acknowledgement

WE have been looking over the cards, calendars and good will messages that have come to the MOTOR AGE editorial department during the last few weeks. Some of them are very fine examples of the printer's art and are beautiful to look at.

But the most notable feature about this collection is the humanness of the messages that they carry. These messages indicate that the men at the head of these businesses do take a few minutes away from casting up accounts, counting the unfilled orders and looking over the collection sheet to see where to start collection suits, to think of their friends and to do something that is not directly productive of business.

We believe that it is a good thing for business that men do this. We like to have our attention called occasionally to the fact that there is a humanity in business. Consequently we like to receive these human messages from busy offices. Business is better for them. The fact that they are beautiful, is a mere incident. We acknowledge a gratefulness to those who so remembered MOTOR AGE.

Is your shop equipment in good shape?

15,000,000 Motor Vehicles

REGISTRATION statistics for 1923, compiled by Automotive Industries and published elsewhere in this issue of MOTOR AGE, show that on Dec. 31, 1923, the number of passenger automobiles and trucks registered in the United States was 15,281,295.

This means that more than 15,000,000 motor vehicles must be kept in operation this year. For every one that falls by the wayside to run no more there will be another and maybe two inhale the gas with the kick in it. The American people have decided to ride and the motor vehicle is the preferred means.

Thus is opened up to the men and institutions engaged in the maintenance of automobiles an ever widening field. The vehicles must be serviced. Dealers who sell the cars will do a great deal of servicing. Independent repair shop and garage proprietors will do some of it. Some of it will be well done and some poorly. Many a vehicle fundamentally sound but temporarily disabled will be restored to a life of usefulness and the laws of economics will be served.

The point is—Our industry should see to it that every motor vehicle delivers the full measure of service of which it is economically capable. The men and institutions devoted to this idea are the ones who will prosper.

Accessory sales ring the cash register.

Fight Your Own Battles

A NEWS item printed in MOTOR AGE last week and written by our Washington correspondent indicates that the greater number of the letters received by congressmen in Washington protesting the Federal tax on automobiles and automobile parts, as a hangover from the war, are coming from owners.

It is good and right that the owners should protest these taxes, as they pay them. But the automotive vehicle dealer has more at stake than the owner. This tax is a good deal of an expensive nuisance to him in many ways and it certainly creates a sales resistance. Also there are dozens of prospects who demand that the dealer pay this tax and, strange to say, some dealers are doing it.

We believe that it is the duty of every dealer in the automotive business, no matter what niche of the business he is in, to write to his senators and representatives asking the abolishment of this tax. The tax has been removed from many luxuries and in simple fairness it should be removed from such essentials as automotive vehicles and parts.

Do this today.

High Volume Holds in Production

Maintenance of Employment at Peak Points Is Evidence

Good Reports From Sections Where Shows Have Been Held; Tire Production Up

NEW YORK, Jan. 21.—A high volume of production is reported from automobile producing centers as evidenced by the maintenance of employment by many producers at practically the peak points of last spring. A few major manufacturers are on capacity schedules and others will swing nearer top-notch operations as February approaches and the show season progresses. By the beginning of next month, it is expected that the industry generally will be operating along lines that featured some of the best months last year.

Good reports are being received from sections of the country where shows have been held within the last few weeks and those from New York indicate that the show there has done much to stimulate buying in the metropolitan district. Manufacturers are basing their current operating schedules on these reports and are taking all precautions against a shortage of cars in the spring when buyers enter the market in greatest numbers.

The open weather has proved no inconsiderable factor in keeping up sales at an exceptionally high level for this season of the year, this affecting rural sales in particular. The feeling prevails that rural districts offer possibilities that warrant producers in looking toward those districts as one of the leading markets for automotive products and are preparing the way for aggressive sales campaign there this spring.

The encouraging outlook presented for a year of good sales production is apparent in branches of the industry other than the passenger car. Greater interest is being manifested in the motor truck. Sales in industrial centers continue firm and agricultural sections give signs of offering a readier truck market than heretofore. An impetus to sales is looked for from the good roads show recently held in Chicago.

Business of parts makers is keeping pace with the generally good conditions in the vehicle manufacturing field. Plants have completed their inventory taking period, which was shorter this winter than last, and are operating on high schedules. These schedules will be mounted gradually to meet the greater demand from customers.

In the tire producing field, output is increasing although the figure of a year ago has not been reached. It is estimated that in the Akron district, production aggregates 95,000 tires a day, which is an increase of 20,000 over two months ago.

SHERMAN LEAVES CLASS JOURNAL

NEW YORK, Jan. 21.—Ray W. Sherman has resigned as business counsel of the Class Journal Co. He formerly was in charge of the merchandising department of the Automotive Equipment Association and prior to that was for nine years with Motor World and other Class Journal papers.

George M. Dickinson Resigns From National Motors Corp.

INDIANAPOLIS, Jan. 19.—George M. Dickson, vice president of the National Motors Corporation, resigned from the organization this week and has not yet announced his plans for the future. While resigning from the National Motors merger he still continues as President of the old National Motor Car & Vehicle Corporation whose assets were bought by the National Motors merger more than a year ago.

FARMERS DESTROY EQUIPMENT

MINNEAPOLIS, Jan. 17.—That the farmer, particularly in the northwest, through carelessness destroys enough farm machinery to pay at least half his taxes was brought out by D. E. Darrah of the Hart-Parr Company of Charles City, Ia., at the twentieth annual convention of the Minnesota Implement Dealers' Association ending January 10. Officers elected are: President, S. C. Briggs of Blue Earth; vice president, M. J. Solum, Hitterdal; secretary, C. I. Buxton, Owatonna.

CANNOT SELL STOCK

PHILADELPHIA, Jan. 22.—The Templar Motor Car Co., of Lakewood, is one of the five companies which have been refused registration to do a stock selling business in Pennsylvania, by the State Bureau of Securities of the Department of Banking. The other concerns are not motor vehicle companies.

LEVENE BUYS DANIELS PLANT

PHILADELPHIA, Jan. 23.—The Levene Motors Co., 2200 Diamond street of this city, purchaser of the service rights of the Daniels Motor Co., Reading, Pa., announces the purchase of the entire Daniels plant. The Levene company plans to move the Daniels plant to Philadelphia and there continue the manufacture of the Daniels car.

A. E. F. WHITE DIES

DETROIT, Jan. 22.—A. E. F. White, one of the organizers of the original Cadillac Motor Car Co., and a director until the company was taken over by General Motors, died this week, aged seventy-nine. He was widely known in this city as a financier and banker and had extensive business interests, among them the Acme White Lead Co.

Clarence A. Earl Resigns From National Motors Corp.

Failure of Financing Plan Causes Earl and Associates to Leave

CHICAGO, Ill., Jan. 19.—Clarence A. Earl announced this morning that he had resigned as president and director, Walter M. Anthony as vice president, treasurer and director, and Walter J. Mery as secretary and director of the National Motors Corporation and of its allied National Motors Incorporated, both of which have general offices in the Tower Building, Chicago.

This is the combination of eight companies in the automotive field, with plants in Indianapolis, Ind., St. Louis, Mo., Louisville, Ky., Lockport, N. Y., Jackson, Mich., Saginaw, Mich., Dayton, O., and Atlantic, Mass., formed nearly two years ago, which planned to manufacture and market a line of three "National Sixes" to sell at prices ranging from around $800 to $2,500.

Mr. Earl explained that these resignations were presented only after months of endeavor on the part of himself and his associates to get the interested parties to co-operate in putting the company on a sound basis, through the release of certain large blocks of securities, as promised.

When he was first solicited to accept the presidency of the National Motors Corporation early last year, Mr. Earl said, it had been definitely stated to him by a New York financial house which handled the negotiations that a $3,000,000 bond issue actually had been sold and that the finances of the Company were then in position for him to go ahead with the task of consolidation and organization.

It developed later that the bonds had not been sold and that, Mr. Earl said, the facts had been misrepresented to him. This occasioned the necessity for a substitute re-financing plan which was known as the "Earl Plan," the success of which was absolutely dependent on the complete and cordial co-operation of all of the interests involved.

Largely through his personal influence, Mr. Earl stated, practically all of the bank and merchandise creditors approved their part of the plan. Despite the efforts of Mr. Earl and his associates in the management, it was found impossible, according to Mr. Earl, to secure the united co-operation of all the interested parties which had been promised and which was so vitally essential.

In view of these circumstances, it was impossible for him, as directing head of these corporations, to carry out the plan which he was pledged to do in the interests of the stockholders, the bondholders and the bank and merchandise creditors.

Department of Justice Rule Forbids Distribution of Statistics, Prices and Figures by Associations

WASHINGTON, Jan. 19.—A decision of import, not only to trade associations allied with the automobile industry, but all trade associations as well, has just been rendered by the Department of Justice, ruling that trade associations may not legally circulate statistics concerning production, distribution and prices among its own membership. Such acts the Department rules is a violation of the anti-trust laws.

The mooted question as to how far trade associations may go in their activities was put up to the Department of Justice by Secretary of Commerce Hoover in order that trade associations in general might know their exact status and also cooperate with the Department of Commerce in compiling statistics of the various trade associations. The decision, as rendered by Attorney General Dougherty, however, would seem to further curtail trade association activities, which the Department of Commerce is seeking to broaden, insofar as the law makes it permissible.

In a letter requesting the opinion, Secretary Hoover suggested that the "collection and distribution of unidentified information and statistics as to production, stocks on hand, and prices on closed transactions, provided it is made available on fair terms" to the public as well as those within the association, might not be a violation of the law.

The Attorney General, however, failed to agree, although Mr. Hoover expressed fear that trade associations which now collect such statistics and turn them over to the government might cease to cooperate if refused the right to circulate their own figures.

The gist of the Department of Justice's ruling is as follows:

"Trade associations legally may collect and turn over to the Commerce Department statistics concerning production and distribution, as well as prices of the commodities with which their industries deal. They may not, however, circulate such data among their own memberships.

"In the judgment of the Department (of Justice) the effect of general information as to the conditions of an industry, such as the total production, shipments, stocks on hand and the average price, or range of prices, is entirely different from that resulting from each person engaged in an industry receiving directly, or through a common medium, reports which reveal to him the exact condition of the business of all of his competitors. Again, the idea seems to be prevalent that no exchange of information between the members, regardless of its extent or character, can be unlawful if at the same time publicity be given thereto through the press or some governmental agency.

"In the judgment of the Department this idea is likewise fallacious. The illegality as well as the evil results arise from the cooperation among the members pursuant to a positive or tacit understanding; and this cooperation is not affected by publicity. Those who purchase the commodity, though fully informed as to the activities of the association, can protect themselves only by an organization and cooperation of like character, which, if it were lawful, is an impossibility upon the part of the public."

N. A. C. C. Statement

Belief, that the Department's ruling would in no wise effect any of the activities of the National Automobile Chamber of Commerce, or any of the other trade associations, affiliated with the automobile industry, was expressed by Alfred Reeves, General Manager of the N. A. C. C. and President of the American Trade Association of Executives.

"From my knowledge of the automotive trade associations their activities in the collection and dissemination of data on their business is not such that they would be affected," Mr. Reeves said. "We want to comply with the letter of the law, but at the same time, Mr. Daugherty's opinion, after all, is just the opinion of one man and that is not law."

The activities of the N. A. C. C. will not be curtailed as a result of the ruling, Manager Reeves said. "We shall probably employ counsel to study the ruling and advise us in the matter. The N. A. C. C. distributes every month the figures showing distribution and every three months the amount of money received by the manufacturer. Individual prices are not given. The figures do not disclose any thing but a lump sum and as they cover sedans, trucks and passenger cars, there is no way of arriving at what each cost.

"Before we make any change in our present practice it will be on the advice of legal counsel as to whether or not we are infringing any present law or whether it is contrary to Mr. Daugherty's opinion," Mr. Reeves declared, in speaking of the N. A. C. C.

BAKER BUYS RUBAY

CLEVELAND, Jan. 22.—The Baker R. & L. Co., automobile body and industrial truck manufacturers of this city, have purchased the land and plant of the Rubay Co., makers of automobile bodies for a reported price of $800,000. The combined plants will employ 1500 men. The Rubay Co. turned over important orders for bodies, among them one of 1000 bodies for the Sterling-Knight Co., and another large one for the Stearns-Knight Co.

JACKSONVILLE ELECTS

JACKSONVILLE, Ill., Jan. 18.—At the annual meeting of the Jacksonville Automotive Dealers' Association, officers were elected for the coming year, as follows: President, William H. Cocking; vice-president, Walter Houston; secretary-treasurer, George T. Lukeman; directors, J. F. Clas, Frank Orr and Chester Joy. Reports of the years operations showed many activities, a fine increase in membership, and one of the most successful in the history of the organization.

Roamer Reorganization Now Completed; Officers Named

George P. Wigginton Is President; I. F. Shaefer, Vice President and General Manager

KALAMAZOO, Mich., Jan. 19.—The reorganization of the Roamer Motor Car Company has been completed and plans are now under way to begin active production not later than February 1. The board of directors named includes: George P. Wigginton, Charles A. Blaney, Joseph E. Brown, E. V. Brigham, Charles G. Bard, A. C. Barley, Kalamazoo; W. S. Thomas, Grand Rapids, and Dr. F. S. Bonine, Niles.

The officers are: President, George P. Wigginton; vice president, Charles A. Blaney; second vice president and general manager, I. F. Shaefer; third vice president and assistant treasurer, Richard Armstrong; treasurer, Joseph E. Brown; secretary, E. V. Brigham.

President Wigginton, Mr. Shaefer and Mr. Armstrong are now actively engaged in the work of completing re-organizing the production sales and advertising end of the business. It is as yet too early to announce any changes that will be made, but several parties are now being considered for important positions in the concern.

The re-financing is practically determined and will be officially announced in a few days. In this connection Assistant Treasurer Armstrong reports that 92 per cent of the company's creditors have agreed to accept the new financing proposal, which will give them 20 per cent in cash and the balance in deferred notes dated two, three and four years hence. In the meantime plans are being laid to begin operations at the plant by February 1.

CHANGE AUBURN PRICES

AUBURN, Ind., Jan. 22.—The Auburn Automobile Co. announces a new price of $1695 on the five passenger sedan. This model was formerly $1595. The five passenger touring-coupe has also been increased $100, the new price being $1595. These models are completely equipped at the factory.

A. M. A. MEMBERSHIP DRIVE

CHICAGO, Jan. 19.—At the meeting, last night, of the Automotive Manufacturers' Assn., steps were taken to increase the membership of the organization. Efforts will be made to enroll new members and the committee in charge expects to double the present number within the next year.

FORD 1923 PRODUCTION

DETROIT, Jan. 14.—The 1923 production of cars and trucks by the Ford Motor Co. totaled 2,090,950, an increase of 739,626 over 1922. In addition the company made 101,898 tractors, while the Lincoln division turned out 7,932 Lincolns as compared with 5,378 in 1922.

Build Garage for Four Seat Baby Carriage

BALTIMORE, Md., Jan. 23.—This city is to have something new in the way of a garage in the near future. It will be a structure built to house the "car" which is being used by the famous quadruplets who were born to Mr. and Mrs. George L. Wittig about two months ago. The building will be of cinder block, stuccoed, and will be 8 feet long, 6½ feet high and 6 feet 6 inches wide. A permit for the construction work has just been issued.

Soon after the stork brought the four babies—three girls and a boy—they were presented with a carriage especially constructed for the use of the quartet. But it was found that the "car" could not be taken into the Wittig home and it was decided to build the "garage."

Everyone Interested in the Suits Filed Against State

DALLAS, Tex., Jan. 17.—The eyes of the motorist, the farmer, the banker, the butcher, the baker and the candlestick maker, are now focused upon the results of injunction suits filed in a dozen Texas counties against the Highway department, restraining that state department from taking money collected in the shape of taxes on automobiles, and seeking to have the highway act, under which the new taxes on motor vehicles were assessed, declared unconstitutional.

Temporary restraining orders have been issued against the highway department in every case asked. When the hearings are had to see if these temporary orders are made permanent the decisions will be appealed by the party receiving the adverse decision and the matter may drag through the courts for months. It is said if the highway law is declared unconstitutional an extra session of the legislature will be called immediately to deal with the tax emergency thus developed.

The motorists are being taxed more than $10,000,000 and this forms a considerable amount of the levy for the state. The counties fighting the law have taken the action because of the fact that the measure provides some 80 per cent of the tax collected must be turned over to the state highway department.

But the motor vehicle owner has "already been skinned." He has paid his taxes and it is believed whatever action the courts may take in connection with a decision on the validity of the law those taxes will not be returned to the motorists.

TO ENTERTAIN N. T. D. A.

AKRON, O., Jan. 19.—The tire industry, Chamber of Commerce and tire dealers associations and groups will combine in entertaining the National Tire Dealers' Association which will hold its annual convention in Akron in November.

TRUCKS SPEED UP MAILS

ST. PAUL, Jan. 17.—On January 14 motor truck service was instituted by the postoffice department to facilitate transportation of mail between Minneapolis and this city. The service now is by train and by letter boxes on trolley cars. Trucks will leave each city hourly from 8 a. m. to 6 p. m., except between 11:30 a. m. and 1:30 p. m. when it will be half hourly service. Intermediate postoffice stations on the route will thereby get quicker service as well as terminal postoffices. Formerly mail sometimes was 12 to 24 hours between the two cities, due to passage through stations and waits for mail trucks.

IMPROVE INDIANAPOLIS

INDIANAPOLIS, Jan. 19.—A few important changes have been made at the Indianapolis Motor Speedway grounds during the winter months with the view of increasing seat locations directly in front of the pits. This has been done by moving the starting line farther north to the south edge of the tunnel and extending the repair pits to the center of the paddock stand, thereby making this amphitheatre a greater vantage point.

To further safeguard and protect the drivers a bumper board has been mounted at the edge of the stretches not already protected by a cement wall.

CYLINDER GRINDERS ORGANIZE

PHILADELPHIA, Jan. 22.—A new organization—the Cylinder Grinders' Association of Philadelphia—recently joined the ranks of the automotive industry here. The members include: American Grinding Co., Hercules Welding and Machine Co., Houpert Machine Co., Alexander Klein, Lawndale Tool & Machine Co., Model Repair Co., Pedrick Tool & Machine Co., Philadelphia Piston & Grinding Co., Schiller-Nolan & Co., Frank Sieling Machine Works, Omer Simon, Starbuck Auto Co., General Auto Supply Co. and Vallette Co.

ELECT MINNEAPOLIS OFFICERS

MINNEAPOLIS, Jan. 18.—At the fifth annual meeting of the Minneapolis Garage Owners' Association, January 10, the dinner attendance was about 650 persons. Guests of honor were A. G. Albrecht of St. Paul, the first president, and R. A. McMillan, second president. New officers are: President, N. C. Bleeker; vice president, F. W. Eddy; treasurer, E. A. Zolle; secretary and manager, A. N. Benson. The latter succeeds W. J. Johnston, who has served three years. New directors are W. J. Potts, J. L. Mowry, F. B. Wilcox, H. F. Christian, Thomas Gavin and Clifford Horton.

3500 BALLOON TIRES A DAY

AKRON, O., Jan. 19.—Production of balloon tires in the United States has reached a total of not less than 3500 a day according to the best informed balloon tire experts in the rubber city. This total has been reached in less than a year after the first unofficial announcements regarding the new tire were made in the automotive world.

Award Compensation to Disabled Salesman

SALT LAKE CITY, Utah, Jan. 19.—When does an automobile salesman working on a commission basis cease employment? William H. Johns, a salesman for the Covey-Ballard Co. of this city met with an accident while driving home from Murray, near here, last June. Compensation was claimed on the ground that a salesman on commission is always on duty. It was contended by Johns and his attorney that an automobile salesman often picks people up while driving home and makes "prospects" out of them. It was admitted that plaintiff was alone at the time of the accident, but it was contended the rule as regards picking people up held good and that he might have had someone with him.

Two out of three of the members of the Commission upheld the claim and awarded compensation. The dissenting member of the Commission, Chairman McShane, said employees of automobile companies were not expected to follow any such practice as was suggested and when a man left the premises of the employer or was actually on his way home after a day's work he could not be said to be still on duty.

St. Louis Drafts New Laws for Regulation of Traffic

ST. LOUIS, Mo., Jan. 22.—Officials of the Safety Council have drafted a new traffic code which is pending before the Board of Aldermen which they feel will have a tendency to reduce automobile accidents if passed.

Under the present law the speed limit is 10 miles an hour within the city limits. This law is universally ignored. Under the proposed new law the limit would be 25 miles an hour within the city limits and the driver would be held responsible for careful and prudent driving under all circumstances.

Blinding headlights which were the cause of many accidents last year and under the new code headlights would have to be tested periodically to insure against blinding of other drivers.

Crossing the streets between intersections by pedestrians was the direct cause of twenty-three fatalities last year, but there is no provision in the new code to prohibit this practice. Attempts to pass such a law were made a few years ago and met with dismal failure.

PREPARE FOR DES MOINES SHOW

DES MOINES, Jan. 15.—At the annual meeting of the Des Moines Automobile Dealers' Association, held recently, Dean Schooler was re-elected president of the association and C. G. Van Vliet continued in his work as secretary-treasurer. With the election of officers concluded, members of the association turned their attention to plans for the 1924 automobile show.

According to early report, practically all space available for the show at the Coliseum has already been sold.

Akron May Adopt Buses as Principal Transportation Means

Street Car Company Ordered to Continue Operations at 5 Cents or Stop Feb. 1

AKRON, O., Jan. 19.—The tire capital of the world has given itself over to a thorough discussion of buses not only for the country as a whole but with a view of possible adoption for its own public transportation following order by council that the local street car company either continue operations at a 5-cent fare or suspend operations after February 1.

If the traction company ceases operation a bus transportation company will immediately take its place according to announcement by Mayor D. C. Rybolt who has been negotiating with bus companies during the past week.

A similar situation in any other city in the country might not create interest but it is generally believed by rubber men that the action of the tire capital will be closely watched by outside interests.

Perfect honesty demands however, the statement that the rubber city which has spent millions of dollars in developing the bus business throughout the world does not take wholeheartedly to the proposal that buses replace street cars if the reports from men who have long been recognized as judges of public opinion can be relied upon.

The rubber companies are notably silent regarding their opinions as to whether buses should be tried exclusively or whether some arrangement with the street car company should be made.

It is possible, under existing conditions, that the prediction made by Frank A. Seiberling when he was president of the Goodyear Tire and Rubber Co. that within ten years street cars would be obsolete in Akron may be materialized within the next few weeks.

Cleveland Set for Opening of Greatest Show in History

CLEVELAND, Jan. 17.—Cleveland is set and ready for the opening of the largest automobile show ever held in this city. The opening ceremony will take place in the Public Auditorium and Central Armory, Saturday, January 19, and the doors will remain open to the public until January 26.

The Cleveland Automobile Manufacturers and Dealers Association, Herbert Buckman, manager, which is staging the twenty-third exhibition, will have 58 makes of passenger cars on the floor. Five of the number have never been exhibited at a Cleveland show. They are the Rollin, Chrysler, Flint, McFarland and Sterling-Knight. Nine of the cars to be seen are Cleveland products. They are: Kurtz, Templar, Winton, Stearns, Chandler, Cleveland, Jordan, Peerless and Rollin.

MADISON SHOW FEB. 7-10

MADISON, Wis., Jan. 19.—Wisconsin's Capital show will be held Feb. 7 to 10, it has been decided by the Madison Automotive Dealers' Association. The new Gill garage, having the largest single floor area of any building in Madison, has been secured and space is now being offered to exhibitors, with Jan. 20 as the date of drawing for places. The show this year will be managed by a committee consisting of O. S. Jacobson, Neil Fox and Ralph Hult. A local advertising agency has been engaged to map out and execute an organized plan of reaching every person in southwestern Wisconsin. Newspapers will be used and posters will be distributed among all garages within 30 miles of Madison. Exhibits will be limited to dealers with established places of business in Madison.

Elaborate Decorations Mark Opening of Springfield Show

SPRINGFIELD, Ill., Jan. 25.—Elaborate decorations, the most notable in the history of the Springfield Automobile Dealers' Association, marked the half million dollar motor car display which opened at the state arsenal Thursday, Jan. 24, and continued through Friday and Saturday following. Every motor car and accessory dealer of Springfield, was represented with an exhibit.

The Springfield show has always been classed as the most notable held in Illinois outside of Chicago and this season's event, strengthened the reputation of the Springfield dealers in this direction. The dealers here are particularly fortunate in the possession of a building of adequate size in the state arsenal.

The annual show is counted upon to stimulate spring buying of cars. The winter business enjoyed by the Springfield dealers has been highly satisfactory, sales comparing favorably with those of a year ago. Prospects for new cars, became numerous with the advent of the annual show and the local dealers made the most of their opportunity. The industrial and agricultural situation is highly favorable.

SHOW AT FULTON

FULTON, Mo., Jan. 21.—The Fulton Automotive Dealers' Association has announced that plans will be outlined at once for an automobile show in this city in early spring. Steps will be taken to secure a large tent under which to hold the show and a number of high class amusement features will be provided. Officers have been elected as follows: President, Austin Crenshaw; vice-president, L. H. Maughs; secretary, W. B. Whitlow; directors, Harry Backer, Scott and B. H. Jameson.

RACINE SHOW FEB. 7

RACINE, Wis., Jan. 18.—There will be an automobile show held in Racine, Wis., Feb. 7, 8, 9 and 10, under the auspices of the Racine Journal-News. This will be the first Racine show since 1919.

Plans for St. Louis Show Completed; New Site Chosen

Building Well Suited to House Display; Decorations to Be Feature

ST. LOUIS, Mo., Jan. 19.—Arrangements for the automobile show of the St. Louis Automobile Dealers' Association to be held February 16 to 23, are virtually completed. Robert E. Lee, manager of the St. Louis association, is general manager of the show and Joseph A. Schlecht of the Mound City Automobile Co., Gardner distributors, is chairman of the committee for the show and P. H. Brockman of the De Luxe Automobile Co., Oldsmobile distributor, Samuel Igou of the Igou Motor Co. and H. F. Fahrenkrog, president of the Dealers' Association, are members of the committee.

The new building of the Columbia Can Co. at 5215 Natural Bridge Road which was but recently built and which has not as yet been occupied has been secured for the show. The committee closed negotiations for the use of the building after it had been disappointed by other locations. There were several other buildings under consideration but for one reason or another were unsuitable for the purpose. The building which has been secured and of which two and a half floors will be available for show purposes is ideal in every way for the holding of the show. There will be 200,000 square feet of floor space used.

Close to the Columbia Can Co. building is the plant of the Chevrolet Motor Co., in which one of the most successful shows of the St. Louis Dealers' Assn. was held and is adjacent to another building in which a successful exhibition was held a few years ago.

In addition to the other advantages of the building the large space available will admit of a truck exhibit which has not been possible for the last five years because of the lack of such space. There will be 15 firms which will exhibit trucks at this year's show.

Forty-three passenger car dealers have made reservations for space and altogether the coming show gives promise of being one of the most successful ever held in the City of St. Louis.

HUNTINGTON SHOW WEEK

HUNTINGTON, W. Va., Jan. 19.—The 1924 Huntington Automobile Show will be held the last week in February, according to an announcement made by Garland Roberson, secretary of the Huntington Automobile Dealers' Association.

At the regular meeting of the Huntington Automobile Dealers Association the following officers were elected for 1924: President, D. E. Connolly, of the Connolly Motor Co.; vice-president, Herbert Nash, of the Nash Motor Sales; Jim Thaxton, of the Hanley Cadillac company, was re-elected treasurer; Bruce Perry and C. B. Curlee were chosen for directors.

New Schedule of License Tax Is Effected by California

Flat Fee for Each Type of Vehicle Is Called for in New Law

SAN FRANCISCO, Calif., Jan. 22.—A new schedule of license taxes went into effect throughout California January 15, under the provisions of the Breed Motor Vehicle Bill, passed into law at the last session of the state legislature. Instead of placing the license fee on the horsepower of the machine, as in the previous system, the new law is based on a flat fee for each type of automotive vehicle. The majority of passenger automobiles, classed as "non-commercial vehicles," are paying a flat tax of $3 to cover the license plates and the work of registering each motorist. In addition to this, of course, each passenger-car owner pays two cents a gallon tax on all the gasoline he uses. This tax went into effect last September.

Commercial automobiles equipped with pneumatic tires, are taxed on a sliding scale, based on the weight of each car, plus an additional flat tax of $3. Cars in this class weighing less than 3,000 pounds, are taxed $5; those of 3,000 to 6,000 pounds, $10; from 6,000 to 10,000 pounds, $15; and over 10,000 pounds, $20. Commercial cars with solid tires pay, in addition to the $3 flat rate, the following license taxes: Less than 3,000 pounds, $10; from 3,000 to 6,000 pounds, $20; from 6,000 to 10,000 pounds, $30; more than 10,000 pounds, $40.

Electrically propelled vehicles with either pneumatic or solid tires are taxed $50, in addition to the $3 tax, irrespective of size, age or previous condition. Rates on trailers vary with weight and size.

S. A. E. Entire Ticket Voted in Without Any Opposition

NEW YORK, Jan. 19.—Results of the annual election of officers were announced at the annual dinner of the Society of Automotive Engineers held at the Hotel Astor. The entire ticket, headed by Henry M. Crane of the General Motors Corp., was elected without opposition.

The new officers are as follows: President, H. M. Crane; first vice-president, E. A. Johnston; second vice-presidents, W. R. Strickland, representing motor car engineering; J. F. M. Patitiz, tractor engineering; H. L. Pope, aviation engineering; W. C. Ware, marine engineering and T. B. Fordham, stationary internal combustion engineering; treasurer, C. B. Whittlesey; councillors for the term 1924 and 1925, J. H. Hunt, A. K. Brumbaugh and M. P. Rumney.

Speakers at the dinner included Herbert W. Aldem, retiring president; Dr. M. L. Burton, president of the University of Michigan; Edward S. Jordan, who acted as toastmaster, Henry M. Crane, president-elect and "Bugs" Baer, humorist. Dr. Burton's address, entitled "That Mind of Yours," was well received.

Mr. Crane spoke of the need for wider application of standards in production work and the value of research work to the industry. He urged executives to see that their representatives in Congress make adequate appropriations for continuance of the valuable automotive research work done at the Bureau of Standards.

The importance of the activities of the various section organizations of the society was emphasized. It was announced that past President B. B. Bachman will act as chairman of the Sections Committee.

Oregon Distributor Sues Manufacturer for $104,000

PORTLAND, Ore., Jan. 18.—A suit for $104,000, which has been filed here by the Northwest Auto Company against the Reo Motor Company promises to attract the attention of dealers and manufacturers all over the country. Already Oregon automobile men are keenly interested in the suit, as it involves the matter of relations between the automobile distributor and the manufacturer, and may to some extent clear up the matter of just what the rights of the dealer are as against the manufacturer, and vice versa.

The Northwest Auto Company had been Oregon distributor for Reo since 1910, but on December 31, 1923, this relationship ceased when notice to such effect was received by the local firm from the Reo factory. The action was taken by Reo after several months of investigation of the local field, which included a visit here by Sales Manager Reuschaw of the Reo factory, and was said to have been taken because of the belief of the company that the local firm was not giving the Reo the representation in this territory to which it is entitled.

Shortly after the new arrangement went into effect the Northwest Auto Company filed the suit and attached seven carloads of cars in the warehouses in Portland, which had been sent to the local company but not taken up by them. The sum of damages is arrived at by reciting expenses claimed already involved, such as freight charges, and estimated profits on cars and parts from January 1 to July 31, the latter date being the time when a verbal contract which the local firm alleges it was operating under would have expired.

SERVICE AT TEN CENTS

SAN FRANCISCO, Calif., Jan. 22.—The first attempt made on the Pacific coast to establish and maintain guaranteed upkeep costs for passenger automobiles is announced by the Boyer-Brouillet Motor Company, retailers of the Willys-Knight and Overland cars in this territory. This firm guarantees to keep any Overland car sold by it after Jan. 1, 1924, in proper running condition, including all labor and parts, with the exception of tires and batteries, and damages from wrecks and collisions, at a cost of 10 cents per day to the owner.

1923 Is Biggest Year in the History of Georgia Dealers

Registration Last Year Gains Over 30,000 Cars on 1922

ATLANTA, Ga., Jan. 19.—Figures announced by the Georgia Motor Vehicle Department on automotive registration in 1923 as compared with 1922 and some of the best previous years, indicate that 1923 was undoubtedly the biggest year in the history of the automobile industry in Georgia so far as the volume of car and truck sales is concerned.

Registration in 1923 was 173,794 cars and trucks, as compared with 143,400 in 1922, a gain of more than 30,000. Passenger cars registered in 1923 were 151,325, a gain of about 25,000 over 1922. Trucks registered last year were 22,469, a gain of more than 5,000 over the previous year.

The department states that 1923 was the best year in its history, exceeding any previous year by more than 20 per cent, which means that sales by Georgia dealers last year were from 15 to 20 per cent better than any previous year.

Lincoln Highway Association Meets; Re-elects Officers

DETROIT, Jan. 21.—The tenth annual meeting of the board of directors of the Lincoln Highway Association, held here last Thursday, was marked by the re-election of all the officers and the holding of Founders' Dinner at the Detroit Athletic Club that evening, given by President J. Newton Gunn, attended by such prominent figures in the industry as Roy D. Chapin, Alvan Macauley, G. M. Stadelman, E. V. Rickenbacker, E. W. Bassick, Colonel Henry B. Joy and others.

The board discussed the western highway situation, which includes the well known Utah angle, and decided in view of present conditions to temporarily hold up western appropriations, although there is a substantial sum in the treasury for that purpose. The board feels that until Federal aid can be invoked in this work that it had better pursue a policy of watchful waiting. Income for the year was $50,944.94 and expenditures $42,379.95.

TAXES IN MINNESOTA

ST. PAUL, Jan. 18.—Automobile tax receipts for 1923 in Minnesota were $7,337,526.19, covering licenses of 454,395 machines, $23,113.50 for transfers, $6,042 for dupliacte plates, $1,505.25 for duplicate certificates, $7,359 for chauffeur licenses. Secretary of State Mike Holm prophesies 500,000 registration in 1924. Five million dollars permanent work was done on Minnesota roads in 1923 and 42 miles were paved. Upkeep cost was $3,000,000. In addition to $7,275,000 for registrations $1,850,000 was received from the government and $2,500,000 from county reimbursement funds.

Stutz Representatives Review the Year

Sue to Prevent Dissolution of the Dorris Motor Car Co.

ST. LOUIS, Jan. 18.—Suit to prevent the dissolution of the Dorris Motor Car Co. has been filed in the circuit court by Webster Colburn, former vice-president and general manager of the company, and E. J. Scott, who presented a petition signed by 400 stockholders.

Appointment of a receiver to conserve the assets of the company for the stockholders and creditors is asked in the suit and an injunction against the company officials to prevent them from proceeding with the liquidation. The defendants named are Frank C. Thompson, vice-president and member of the board of directors; H. B. Krenning and Parker H. Woods, directors.

The petition sets out that the balance sheet of the company for Oct. 31, 1923 showed the company possessed assets valued at $831,979.43 and liabilities, exclusive of the stock, were only $66,269.32.

It is charged that Krenning conceived the idea of liquidating the company, paying off the company's debts and the preferred stockholders and leaving nothing for the holders of common stock.

A committee of the common stockholders, it is stated, last November offered Krenning $75,000 for his 1000 shares of preferred stock, but the offer was refused and it is further charged that on Nov. 18 last, Krenning told the stockholders that if they would vote for liquidation he would waive all of his claim except the $100,000 par value of the preferred stock and $15,000 accrued dividends and induced two-thirds of the stockholders to vote for liquidation.

TIRE PRICE INCREASES OUT

AKRON, O., Jan. 19.—Prospects of tire price increases on replacement tires during the first month of the year have been practically wiped out and the companies which hoped for an advance during January now hope that the advanced price lists will become a reality by the middle of March.

In some quarters it is still hoped that an advance will take place during February but for the most part the companies which need it the worst are pessimistic of such developments.

Therefore the rubber industry for the most part continues to operate at a high production point of almost 110,000 tires a day for the state of Ohio with little if any prospects for profits. The first month of the year is a continuation of the last half of 1923 when profits during the whole half did not amount to as much as the proceeds of one month's operation during the first half.

GARAGE OWNERS ELECT

CHICAGO, Jan. 22.—The Chicago Garage Owners' Association held their annual meeting, election of officers, banquet and dance on Tuesday, January 15, at the Lexington Hotel. Officers elected for the coming year were, president, F. C. Burrows, Sterling Garage; vice president, R. A. Goudie, Square Deal Motor Co.; treasurer, H. E. Halbert, Garfield Park Garage; secretary, J. G. Thomson, Rhodes Garage.

The retiring president, J. R. Emery, owner of the Union Club Motor Livery and under whose administration the association has made great strides in bettering garage conditions in Chicago was presented with a complete fishing outfit and is leaving shortly for Miami, Fla. where he will try it out until April 1.

"HOUSE CLEAN" USED CARS

ST. LOUIS, Mo.—Dealers subordinated the sale of new cars last week to engage in the annual housecleaning of used automobiles. In many cases new cars were moved out of the showrooms in order to better display the used car stocks. A yellow diamond with the announcement "Yearly Used Car Clearance Sale" was universally used with displays.

And the buyer, too, benefited greatly by this sale because in their anxiety to turn over the used car stocks dealers made special price concessions.

Dealers to Have Voice in Templar Factory Policies

NEW YORK, Jan. 19.—An interesting merchandising plan in which the dealer organization is to have an active voice in the shaping of factory policies was announced by the recently reorganized Templar Motor Co. of Cleveland.

The plan will function through a dealer association which will be represented in contact with the factory by a board of governors and an executive committee. The board of governors will be chosen from among dealers having the largest sales volumes and the executive committee will be elected from among this group by the dealers. Details of the plan provide for an annual meeting of the entire dealer association at the factory and conferences at the factory between the factory executives and the executive committee whenever the dealers have matters to be brought to the attention of the factory heads.

Through this close cooperation with the men who come in direct contact with the buying public it is hoped to gain considerable valuable assistance particularly in the shape of selling and advertising plans. Other details of the merchandising plan include the extension of a one year guarantee on Templar cars and a guarantee against price decline. Another interesting phase of the plan provides special used car merchandising assistance.

BIGGEST OAKLAND SHOW CLOSES

OAKLAND, Calif., Jan. 22.—The sixth annual automobile show held in Oakland opened here on the night of January 12, with 43 dealers exhibiting 225 cars and trucks, the whole exhibit, including the accessories, equipment and tire displays covering 13,500 square feet of space in the municipal auditorium and in an additional wooden building erected when it was seen that the auditorium would not house this show, the largest ever held.

Studebaker Dealers at Annual "Get-Together"

Philadelphia Show in Mid-Week Is a Marked Success

PHILADELPHIA, Jan. 22.—Philadelphia's twenty-third annual automobile show is in full swing at the Commercial Museum, Spruce street, below Thirty-fourth, with a record-breaking attendance. Four hundred cars, valued at $1,000,000 and representing 62 different makes, are shown by 51 exhibitors and 38 accessory concerns are represented. The interest of women, especially in the "show," rather than in the stock models, with their extra burnished metal and striking refinements, has been a feature. A gratifying number of sales in the more expensive and medium-priced cars already have been reported.

The architect and decorator, Philip S. Tyre, who has had the staging of the show for years, has produced an effect after the plan of a richly colored Egyptian hall. Vaulted ceilings are carried on monumental Egyptian columns and the spaces between are filled with bizarre, graceful draperies of green and white striped sateen. The ceilings are of white muslin, faintly tipped with ivory. The columns are of daffodil yellow and the applied designs are of green, vermillion and orange. Traceries of black and white run rhythmically through the applied designs. About 500 lanterns and torches with stenciled shades in Oriental hues and design lend an air of mystery.

The floor plans, too, are a step in advance. The aisles have been increased and cross-aisles have been arranged so that virtually every exhibition space is a corner display.

GARAGE CONSTRUCTION LEADS

BALTIMORE, Md., Jan. 23.—More garages were erected in Baltimore during 1923 than any other character of building, the annual construction records show. There has been a keen shortage of garage space and every day sees the application for many permits to erect the buildings. A recent snowstorm at night showed that a large number of cars are exposed to the weather. A surprising number of the cars seen on the following day were covered with snow, demonstrating that they had not been in garages during the night.

During the last year permits were issued for the construction of 3,401 garages, the cost being placed at $2,414,-190. Two-story dwellings were the next item on the list with a total of 2,659. The total number of dwellings of all kinds is the only item that exceeded the garages.

TIRE FRAUDS EXPOSED

WASHINGTON, Jan. 23.—A fraud order has been issued by the U. S. Post-office Department against the Rose Tire Company, Rose Tire Corporation, United Financing Syndicate, Dealers Tire Company, Low Price Tire Co., Mail Order Tire Company, and their officers and agents as such, at Chicago, Ill.

All mail addressed to any of these companies, their officers or agents, is being returned by the Department to the senders. Hundreds of dealers and jobbers through the country have been swindled by various methods by these companies, the Department's investigation shows, while thousands of automobile users in practically all parts of the country have sent money for "cut prices" and "cheap" tires, only to find later that they have been the subject of a fraud.

TOLEDO AT TOP SPEED

TOLEDO, Jan. 19.—Toledo's employment in automotive plants is almost up to the 1923 peak at the present time.

Last week there was a net gain of 1,968 employes in the 51 plants which report to the Merchants' & Manufacturers' association for a tota lof 25,672.

This is compared with approximately 15,000 in the same plants a year ago.

The Willys-Overland and its many subsidiary automotive plants here are all going at full speed. It is expected that Overland production will be 1,300 cars a day early in February.

Rickenbacker to Advertise Delivered Prices Everywhere

NEW YORK, Jan. 19.—In connection with a reduction of $40 in the price of its open models, Rickenbacker Motor Co. has announced that it will build its complete line fully equipped and will advertise it according to its delivered price. Closed model prices remain as formerly but these will practically represent a reduction in view of the extra equipment they will carry.

In announcing its intention to determine the freight and handling cost on every car at the factory and to advertise prices in each section of the country according to these, the company declares its determination to inspire public confidence in the dealer and in the factory. Additional prices sought by dealers in the industry through the medium of juggling delivery prices, have made list prices meaningless and factory efforts on merchandising have been largely nullified through unfair or unsound dealer practice.

MOLINE COMPANY UNCHANGED

MOLINE, Ill., Jan. 19.—The incorporation this week of the Stephens Motor Car Service Company of Chicago and Freeport to deal in cars, trucks, tractors and farm machinery, will not take over stock or manufacturing facilities of the Stephens Motor Co., or take over the tractor works of the Moline Plow Co. The new corporation has $50,000 capital stock which is held as follows: Standard Motor Parts Co., Chicago, $49,700; Michael Tauber, Chicago, Harold F. White, Chicago, and Sam Levy, Chicago, $100 each. George N. Peck, president of the Moline Plow Co. said that the new company will manufacture and supply service parts for Stephens automobiles and Moline Universal tractors. "The manufacture of Stephens automobiles and Moline Universal tractors remains, unaffected by the incorporation of the new company, Mr. Peck stated.

Half a Million Used Automobiles in Dealers' Stocks, Dec. 15; Valued at $153,820,000

N. A. D. A. Issues Interesting Figures on Used Car Losses in Chicago and St. Louis; Collins on Program for Chicago Convention

ST. LOUIS, Jan. 18.—Half a million used automobiles were in the stocks of dealers Dec. 15, 1923, representing a capital investment of $158,820,000. The actual figures comparing the 1922 end-of-year conditions with 1923, were made public by the National Automobile Dealers' Association here today. They are as follows:

Cars on hand	396,400	449,520
Average acquisition cost	$353.74	$322.31
Total capital investment	$150,264,800	$153,820,000
Average capital investment, per dealer	$3,506.62	$3,845.50
Average number cars, per dealer	11.23	9.91

Officials of the N. A. D. A. believe that these figures forecast in some measure what the dealer can expect for 1924 in the handling of used automobiles. James Collins, of the Class Journal and Chilton companies, will have a prominent place in the program of the seventh annual convention of the N. A. D. A. in Chicago, January 29 and 30 at Hotel LaSalle, and will forecast the outlook for 1924 automobile business. His studies of the industry have produced figures to indicate what the possible profits will be in 1924 and using the used car surveys of the N. A. D. A. will be able to foretell fairly accurately what the dealer can expect to show for his year's work.

The figures indicate that there will be a large increase in the number of used car deals in 1924 at considerably less per car. The greater number of deals will cost more to handle per car with lesser prices involved, increasing the possibilities of loss and the necessity for greater watchfulness and care on the part of the dealers.

$57,347,000 Lost in St. Louis

ST. LOUIS, Jan. 18.—Automobile dealer losses in the purchase and sale of used automobiles for 1923 totaled $57,347,000. These figures were announced at headquarters of the National Automobile Dealers' Association here today, in connection with announcements of the Used Car Forum which is to take up practically all of the second day of the seventh annual convention in Chicago, Tuesday and Wednesday, January 29 and 30, at Hotel LaSalle.

The losses for 1923 were $66,304,200 less than the total losses for 1922. The N. A. D. A. executives have been receiving reports from thousands of automobile dealers and city automobile dealer associations, in which the N. A. D. A. leadership in the campaign on used car losses is warmly commended.

$50,000,000 Cut Off Used-Car Losses by Dealers During 1923

CHICAGO, Jan. 18.—Automobile dealers reduced their used car losses $50,000,000 in 1923 over the losses suffered in 1922 according to C. A. Vane, general manager of the National Automobile Dealers' Association, who will present an analysis of the used car situation to the Seventh Annual Convention of the National Automobile Dealers' Association at Hotel LaSalle, Chicago, January 28-31. The meeting will be open to all dealers of the United States. Special reduced rates of fare and one-half have been granted by the railroads to members of the association.

"We estimated that the dealers of this country in 1922 lost $105,000,000.00 on used cars," said Vane, "and that loss is represented only by the difference between the price at which the dealers bought the used cars and the sum for which they sold them, and does not take into consideration the sales, reconditioning and overhead expense."

Feature of Ford Truck Body Is Low Price, $490 Complete

DETROIT, Jan. 22.—With the start of quantity production of its new body and cab, Ford Motor Co. is announcing its one-ton truck complete at $490. The company has been able to build only a limited quantity of the complete truck to this time but within the next few months will be in large production and will be making deliveries through all of its dealer organization.

The new body is not built by Ford but is of Ford design and is being shipped to the many assembly plants of the country for assembly into the complete truck. It is the all-steel combination body and cab which the company said last year it would build to reduce the price of the complete vehicle and will greatly increase sales possibilities.

The body is of the express type but is convertible into other types by use of stakes, side boards, canopy top, screen sides. It will meet both agricultural and commercial requirements at low cost. All steel features are designed to meet severe usage, and wood reinforcements are used to lessen vibration and road shock. Loading space is seven feet two inches long by four feet wide. The end gate is braced and secured by heavy chains to hold it in position when lowered.

The cab is extra roomy; the seat artificial leather and cushioned on four inch springs. There are close fitting door cushions which open with the door. Rear vision is offered by an oblong window.

Colin C. Campbell Resigns as Chevrolet Sales Manager

Long Vacation Constitutes Immediate Plans; C. E. Dawson Acts as Successor

DETROIT, Jan. 21.—The resignation of Colin C. Campbell as general sales manager of Chevrolet Motor Co. following the division's most successful year, comes to Detroit as the most unexpected piece of news in a year. Mr. Campbell was one of the strong men of General Motors and is generally accredited with being the outstanding figure in the rise of Chevrolet to the position of the second largest producer in the country.

Mr. Campbell said his resignation was tendered previous to the New York dealer meeting and was effective Jan. 1, though announcement of it was not made public until a week ago. He declined to comment upon the reasons for it, saying it was a matter strictly between the corporation and himself. His immediate plans, he declared, are for a long vacation trip, following which he will decide upon his future business plans. In all probability, he said, he will continue to make his home here.

C. E. Dawson, who will be acting general sales manager, has for some years been principal assistant to Mr. Campbell and is well known in the Chevrolet organization and in the industry. W. S. Knudsen, who is the new general manager, has been production manager for Chevrolet for about three years, coming there from Ford Motor Co., with whom he had been production manager for a long period.

NEW PAIGE PRICES

DETROIT, Jan. 19.—Prices on the new Paige models exhibited at the New York and Chicago shows are as follows; Standard models four and seven phaetons, $1,795; five and seven passenger sedans, $2,595. In the De Luxe models, four and seven passenger phaetons are $1,995; 5-pass. brougham $2,395, and five and seven passenger sedans, $2,770. De Luxe models include the following additional equipment: Fifth cord tire, tube and cover; bumpers front and rear; luggage rack and body guard rails at rear; nickel radiator and headlamps; motometer, automatic windshield wiper; rear view mirror, combination stop and tail light, and sun visor. Disk steel wheels are $35 extra on all models.

FORD DEALERS EXHIBIT

CHICAGO, Jan. 22.—The Chicago Ford dealers have taken 8,000 square feet in the Greer Auto Exhibition Building, 1515 S. Wabash avenue, for the week of the show, Jan. 26 to Feb. 3. They will display the complete Ford line.

HUDSON SPEEDSTER PRICE

DETROIT, Jan. 22.—The Hudson Motor Car Co. announces the correct price of the Hudson Speedster as $1350.

Fight for Repeal of Excise Tax Taken Up by Congress

C. C. Hanch Voices Sentiments of Industry; Other Hearings to Follow

WASHINGTON, Jan. 22.—The fight for the repeal of the excise automobile taxes was taken up Jan. 14 simultaneously in the House and Senate. In the upper body Senator Walter E. Edge (Rep.) of New Jersey introduced three separate bills for the repeal of the excise taxes, similar to the three bills introduced in the House by Congressman Robert H. Clancy. In the House the Ways and Means Committee began its hearings on the taxation revision.

The first organization to be heard by the Committee was representatives of the National Automobile Chamber of Commerce, which urged that the users of the 15,000,000 automobiles be given relief in the form of reduction of their excise taxes.

Emphasizing the fact that the tax on repair parts is a "tax on misfortune" which he declared "has no parallel in the tax statutes of the country," C. C. Hanch, vice president of the Chamber who acted as spokesman, pointed to the wide use of the motor car and stamped these taxes as oppressive measures which react directly upon the 4,500,000 farmers who today own cars as well as the vast army of factory workers, business men, etc., who have found the car essential to their business.

In presenting the argument no attempt was made to urge that the total automobile excise tax amounting to $144,000,000 annually should be lifted at this time. It was urged, however, that Congress should give each of the industries discriminated against, some measure of relief through proportionate distribution of such cuts as may be made.

Particularly was stress laid upon the "misfortune tax" now extracted by the Federal government. In presenting this phase of his argument Mr. Hanch told the Committee:

"The tax on repair parts is now classed as a luxury. How this is so, is beyond comprehension. We have come to regard the tax on repairs and repair parts as a 'misfortune tax'; and I can see no other definition that thoroughly fits it. It certainly is sufficient penalty for the owner of a motor vehicle, whether he be a farmer, a factory employee, or a merchant, when he has a breakdown or a blowout, to have to buy the parts to repair the vehicle; but when Uncle Sam comes along and collects tribute on top of that, as has been said before, he is no Good Samaritan."

Argument was presented to refute the popular fallacy that an automobile is a luxury. "Probably the second largest class of users of motor cars, is the American farmers. The figures show that 4,250,000 are used on the farms. They use them, I think, almost entirely for going with their products to market and purchasing their supplies and taking their families to the towns for shopping, and what may be said almost entirely to be utilitarian purposes," the speaker said.

"The largest class of users is the employees of factories and mercantile institutions. These workers use cars in going to and from work. They do not regard the use of the automobile as a luxury. It's a necessity and the taxing of them for a luxury, is unjust."

In response to questioning Mr. Hanch admitted that the automobile industry during the past two years had prospered. "We do not deny that the automobile industry has grown rapidly," he said. "It has been a very active industry, but we do not for one moment admit that the tax has helped it; and there is not any doubt that the tax has had a detrimental effect upon it, notwithstanding its great proportion."

The value of the purchasing power of the automobile dollar, now worth 111 cents, the speaker cited as one of the reasons for prosperity in the automobile industry. Figures and facts were presented, however, showing that not all of the automobile companies had prospered. During the past two years, the figures showed, 60 manufacturers have gone into the hands of receivers, or liquidated, or gone bankrupt.

The excise tax on motor trucks, the speaker told the committee, should have come off when the government abolished the tax on railroad transportation. Figures were presented the committee and argument made showing that many railroads, shippers and carriers used trucks as well as railroads in the transportation of goods and that as matters now stand the carrier can use the railroads free of excise taxes while he must transfer his goods and haul them a part of the way in a truck, yet pay for transportation excise taxes on the truck haulage, which the speaker pointed out, "is discrimination, pure and simple."

Following the appeal for removal of the tax on trucks, a great deal of argument ensued between the speaker and various members of the committee as to why trucks should not be heavily taxed because they are the hardest on roads, built in part, by the Federal government.

World Motor Transport Congress Program

NEW YORK, Jan. 17.—The program for the World Motor Transport Congress to be held in Detroit, May 21-24, under the auspices of the National Automobile Chamber of Commerce has been announced by George F. Bauer, secretary of the N. A. C. C. Foreign Trade Committee. It is as follows:

Wednesday, May 21

9:30 A. M.—Preliminary assembly of delegates in the banquet hall of the Hotel Statler.

10:00 A. M.—Official welcome of delegates.

Motor Vehicle Session, Part 1—Addresses and discussions centering around different economic services actually being performed by the automobile and motor truck and on possible extension of these and other similar utility uses in all countries of the world.

12:15 P. M.—Luncheon in honor of the delegates from Europe. During this luncheon there will be a review of automotive conditions, problems and possible solution of them by speakers chosen from European countries.

2:00 P. M.—Motor Vehicle Session, Part 2—A vocational automotive tour for delegates to demonstrate the actual uses of motor vehicles by public, industrial, agricultural, mining, commercial and government enterprises.

6:30 P. M.—Reception and entertainment of the delegates.

7:30 P. M.—Engineering session. Addresses illustrated by slides and motion pictures, with the co-operation of the Society of Automotive Engineers.

Thursday, May 22

10:00 A. M.—Finance session. Addresses and discussions as to means for providing financing facilities for shipments to dealers, also retail automotive sales and broader aspects of finance pertaining to large purchases of equipment by government and public utility enterprises.

12:15 P. M.—Luncheon in honor of delegates from the Asias, at which conditions affecting automotive trade in those countries and Australia will be reviewed.

2:00 P. M.—Business promotion session at which principles of advertising and general promotional activities will be discussed.

7:30 P. M.—Servicing session. Topics to be considered will embrace policies and methods of servicing in accordance with plans arranged co-operatively with officers of the National Service Congress, which will meet in Detroit at about the same time.

Friday, May 23

10:00 A. M.—Servicing session, Part 2. Visit to special exhibit of modern equipment in actual operation and used in a modern servicing station. Admittance to be accorded at the time only to delegates of the two congresses.

12:15 P. M.—Luncheon in honor of delegates from Africa.

2:00 P. M.—Highways session, Part 1. Automobile tour of environs of Detroit where exhibits will be provided of different types of road construction and maintenance.

7:30 P. M.—Highways session, Part 2. Topics will comprise general economics of the highway, the training of road engineers, the financing of road construction and maintenance, and the relation of the highway to other means of transportation.

Saturday, May 24

10:00 A. M.—Legislative session. In addresses and discussions efforts will be made to determine what principles underly equitable motor legislation and how governments are applying them to secure greatest economic benefits from motor transport for their respective countries.

12:15 P. M.—Luncheon in honor of delegates from the Americas.

2:00 P. M.—Co-operation session. Addresses and discussions will be devoted to determining what functions are being performed by the automobile owners' associations, dealer organizations, manufacturers associations and other bodies in advancing through co-operation interest in motor transport throughut the world.

7:30 P. M.—Banquet in honor of all delegates to the World Motor Transport Congress.

S. A. E. Annual Meeting Program

NEW YORK, Jan. 18.—The complete program of the annual meeting of the Society of Automotive Engineers, which is to be held in the General Motors building, Detroit, Jan. 22-25, has been announced by Chairman Mason P. Rumney of the Meetings Committee. The program is as follows:

Tuesday, Jan. 22

10:30 A. M.—Standards Committee meeting.
1:00 P. M.—Informal luncheon.
2:00 P. M.—Standards Committee meeting, continued.
2:00 P. M.—Body Engineering session: Charles Widman on "Pre-Enameled Closed Bodies"; W. A. Henderson, "Casein Glues for Automobile Body Assembling"; Round Table Discussion—"Bad Effects of Forced Drying," W. H. Jones, C. R. Wilson Body Co.; R. A. LaBarre, Towson Body Co., and representative of Drying Systems, Inc., E. M. Baker, "Rust Resistance of Nickel-Plated Steel."
2:00 P. M.—Aeronautic session: A. J. Lyon and Samuel Daniels, "Notes on Sand-Cast Aluminum-Copper-Nickel Magnesium Alloy"; G. J. Mead, "Designing for Reliability"; Starr Truscott, "The Engineering Romance of the Shenandoah."
6:00 P. M.—Body Men's supper.
8:00 P. M.—Ordnance Program: Brig. Gen. J. W. Joyes, "New Ordnance Material"; Brig. Gen. C. L'H. Ruggles, "The Automotive Industry and National Defense."
9:00 P. M.—Annual business meeting, adjourned session.

Wednesday, Jan. 23

10:00 A. M.—Brake session: G. L. Smith, "Theory and Practical Advantages of Balanced Brake Forces"; W. S. James, "Brake Performance Studies"; Henri Perrot, "Four-Wheel Brakes."
1:00 P. M.—Informal luncheon.
2:00 P. M.—Motor Truck transportation session: Robert C. Wright, Pennsylvania Railroad, discussion of United States Chamber of Commerce report on railroad and motor truck transportation; R. T. Sangster, St. Louis Chamber of Commerce, "How St. Louis Is Handling the Delivery of l. c. l. Freight and Using Motor Trucks as a Part of Its Transportation System."
2:00 P. M.—Body Engineering session: A. T. Upson and L. N. Erickson, "Wood for Automobile Bodies"; K. L. Herrmann, "Automobile Upholstery"; H. T. Strong, "Trimming Materials and Style."
2:00 P. M.—Fuel and Engine session: C. S. Kegerres, "Comparison of Ideal and Commercial Carbureters"; A. M. Dean, J. W. Swan and C. A. Kirkham, "Fundamental Improvements in Manifold Design."
9:00 P. M.—The Carnival.

Thursday, Jan. 24

10:00 A. M.—Research session: J. A. C. Warner, "Winter Tests Show Greater Dilution with Heavy Fuels"; Roger Birdsell, "Co-operative Fuel Research"; Thomas Midgley, Jr., and H. H. McCarty, "Radiation Characteristics of the Internal Combustion Engine."
1:00 P. M.—Informal luncheon.
2:00 P. M.—Motor Bus session: R. W. Meade, "Motor Bus Design, Operation and Maintenance"; J. A. Emery, "Field and Future of the Motor Bus."
2:00 P. M.—Passenger Car session: G. A. Young, "Controlling Detonation Under High Compression"; C. E. Sargent, "Essentials of a Successful Constant-Compression Engine"; N. S. Diamant, "Notes on Engine Cooling Systems."
2:00 P. M.—Production session: A. A. Brown, "Flexible Method of Handling Materials"; Thomas Nadin, "Suggestions to Purchasers and Users of Machine Tools."
6:00 P. M.—The Sections dinner.

Friday, Jan. 25

10:00 A. M.—Production session: Gordon Lefebvre, "Process and Equipment for Fender and Body Enameling"; T. M. Carpenter, "Crankshaft Production Problems."
1:00 P. M.—Informal luncheon.
2:00 P. M.—Production session: T. B. Fordham, "Reducing Costs by Efficient Management"; R. A. DeVlieg, "Hot Swaging."

Cadillac-Oakland Branch at Indianapolis Now Assured

INDIANAPOLIS, Jan. 19.—The rumored establishment of a Cadillac and Oakland factory branch in this city to distribute Cadillacs and Oaklands through a branch for each line has finally been officially announced, and the E. W. Steinhart Company, which for many years has been the Cadillac distributor for Indiana, and the Oakland distributor for about two years, passes from the picture as far as state distribution of these two lines is concerned.

W. H. Fraser will be in charge of the Cadillac branch distribution for Indianapolis and part of the state; while L. S. Shoup, formerly Oakland distributor here until two years ago, will manage the Oakland branch which will cover Indiana and part of Illinois. Mr. Shoup has been with the Oakland for 11 years. Until two years ago he was the distributor here and then went to San Francisco where he remained until the San Francisco-Oakland branch had been firmly established by him. Then he was shifted to Omaha, and he returns here direct from Omaha.

The headquarters of the two branches will be the splendid Steinhart building at Eleventh and Meridian street, the first of the finer type of structure erected here some years ago for motor car sales plants. The two branches will be side by side in this building which is divided by a low wall on the sales floor. Separate service branches will also be maintained in the building. It is understood that two of the Steinhart branches in other cities of the state will continue for a time at least to act in a local way for at least one of the lines.

OVERLAND IN PHILADELPHIA

PHILADELPHIA, Jan. 22.—The big Willys-Overland plant formally opened here today, is already in operation with a production of 100 cars daily, but its capacity will be more than 200 cars a day. The plant, situated on the Pennsylvania, Reading and Baltimore & Ohio railways, covers over 14 acres.

Bronx Armory Will House New York Show for Several Years

S. A. Miles, Leaving for Chicago, Tells of Remarkably Successful Experiment

NEW YORK, Jan. 14.—The Bronx Armory will continue to house the annual New York show for at least several years to come. While no official action on the part of the Show Commitee of the National Automobile Chamber of Commerce may be looked for at the present time, the consensus of opinion among the leading members of the Chamber is that the wisdom of the radical switch from the Grand Central Palace has been vindicated by the success of the show which closed its doors on Saturday night, with the huge building packed to capacity.

The week ended with everyone satisfied with results, both in the matter of public support, dealer attendance and sales, and Show Manager S. A. Miles left for Chicago, to prepare for the second national show which opens Jan. 26, confident that the industry is well satisfied with New York results and that the Bronx Armory will become the permanent home of the New York show.

As yet there has not been a checking up on attendance sufficient to enable the management to make any public statement as to the count of the gate, but it is declared that the showing was such that the committee will unhesitatingly approve of the Bronx Armory as the ideal location for such a giant exhibition.

Afternoon crowds during the week were lighter than in the corresponding time at the Palace last year, but at night the crowds were unquestionably greater and had the show been in the Palace it would have been impossible to have accommodated the thousands who made the long trip to the Armory. For the first time it was possible to move around in big crowds and see the exhibits easily and as a result the exhibitors found it possible to talk to prospects without interference from sight-seers.

While there has been no check-up as yet as to dealer attendance, it is said that the retailers were just as numerous this time as a year ago and furthermore, they as a rule visited the show several times during the week, despite the distance they had to travel, whereas at the Palace they often contented themselves with one visit.

"A national show in the Bronx—away from the center of Manhattan—was an experiment," said Mr. Miles before he left for Chicago, "and until it was actually opened there was doubt as to its ultimate success. The public and the exhibitors alike have been entirely pleased with the new location.

"The Armory has done away with congestion; the exhibitors have all had an equal opportunity in being on one floor; visitors have found greater satisfaction in making comparisons of the new cars, and everyone has thoroughly enjoyed the wonderful view from the galleries."

IN THE RETAIL FIELD

Motor Service Co., of North Wilkesboro, N. C., has been chartered to do a general garage business, with $100,000 authorized capital and $2,000 subscribed by C. D. Coffey, Sr., C. D. Coffey, Jr., and C. S. Coffey, all of North Wilkesboro.

The Davis-Buick Company, Pekin, Ill., has leased a new garage building, corner of Margaret and Fifth streets, now nearing completion, and will be occupied about Feb. 1. The owner is S. T. Glasford. The plant has a storage capacity for 60 cars. It is one of the finest in central Illinois, costing $40,000.

The Upson-Collier Co., Syracuse, N. Y., has been appointed distributor for the Chevrolet in Cortland county and has opened a sales and service station in Railroad street, Cortland. Bert Upson, one of the firm, was formerly connected with the Franklin Automobile Co. in the engineering department.

Paul Zee, proprietor of Paul's Tire Shop in Syracuse, N. Y., has opened a new store at Palm Beach, Fla., catering to winter tourists and vacationists. Mr. Zee has maintained a store at Miami, Fla., for several years.

Hallenberg-Wagner Motor Co., St. Louis, Ford dealers, opened a new building at 5630 Gravois avenue last week. A luncheon to business associates at the Bevo Mill at which R. E. Lee, manager of the St. Louis Automobile Dealers Assn., presided as toastmaster and a dance in the new building were features.

A new building 85 ft. by 120 ft. will be opened Saturday, January 19, by the Johnston Bros. Tire and Service Co., St. Louis, at the northeast corner of Compton avenue and Washington boulevard. The building, which is two stories high, contains an accessory salesroom, a drive-in gasoline and oil station with modern pump equipment, all under one roof, vulcanizing department for all sizes of tires, solid tire press, greasing pit, tile lined wash racks with air spray washer, and spring service as well as battery charging equipment.

The Cole-Benjamin Co., 3021 Locust street, St. Louis, Cole distributor, has added the Velie line to its stock and will change the name of the firm to the Benjamin Motor Co. The Velie was formerly handled by the Schnure Motor Co., now a Buick dealer, and later by the Velie Glass House under the direction of A. Shields which operated for but a few weeks.

The Rankin-Shuford Buick Company, of Gastonia, N. C., heretofore owned by John C. Rankin, of Lowell, and J. R. Shuford, of this place, has been purchased by Earle Wilson, of this city, and W. G. Lancaster, of Laurens, S. C. Mr. Lancaster will have active charge of the business. He has been cashier of the Enterprise National Bank at Laurens.

Bell Motor Co., Inc., Canton, N. C., has been chartered to deal in automobiles and do a storage and rental business. Authorized capital stock is $50,000, with $24,000 subscribed by W. F., C. V. and H. S. Bell, all of Canton.

The following have been announced by the Auburn Automobile Co., Auburn, Ind., as new dealers in Auburn vehicles: Mathison Motor Sales Co., Main street, Stamford, Conn.; Darling, Norton & Mack, Inc., 312 East avenue, Rochester, N. Y.; Auburn Auto Car Co., 2226 Fairfield avenue, Bridgeport, Conn.; Thos. Deans Auto Service, 16 Balmforth avenue, Danbury, Conn.; Mr. James W. Dunn, 58 Church street, Ansonia, Conn.; A. & S. Motor Sales Corp., Tottenville, S. I., N. Y.; The Hynes Motor Sales Co., Inc., 1609 Bedford avenue, Brooklyn, N. Y.; The Anderson Garage, Jersey City, N. J.; Wirges Bros. Motor Co., 2311 Main street, Buffalo, N. Y.; Glaser-Badner Motor Sales Corp., 579 Jefferson avenue, Buffalo, N. Y.; William D. Rendert, Averill Park, N. Y.; S. W. Reeder Motor Sales Co., West street, Bucyrus, O.

The Joplin Automobile Dealers Association at Joplin, Mo., has decided not to hold an automobile show there this winter because no building with sufficient floor space could be secured in the city.

The California State Automobile Association early in January opened its nineteenth district branch, at Hanford, in Kings County. The new branch replaces the touring bureau which was maintained at Hanford in connection with the Board of Trade Offices, and prior to that, this territory was included in the district served by the Fresno branch.

The Hartford Stearns Knight Co., Hartford, Conn., has removed its salesroom from 120 Allyn street to 170 High street and its service department to 450 Ann street.

The Oldsmobile Co., Hartford, Conn., has removed its salesroom to 120 Allyn street, the former Britton location.

William C. McDowell, Frank Dietrich, W. L. McConnell and Dale Dietrich, all of Youngstown, Pa., except the first named, who is from Farrell, Pa., will take over the Sharon, Pa., branch of the Dietrich Motor Car Company under the incorporated name of the Dietrich-McDowell Car Company. Frank Dietrich will be president and manager of sales.

The Chaperon Motor Company, Case distributors for Oregon, has been appointed Cleveland distributor for the state also. The company recently moved into a large new building at Grand avenue and East Salmon streets, Portland.

The Northwest Nash Motors Company, 1008 Nicollet avenue, Minneapolis, has opened a station for display and sale of used cars at 1021 Hennepin avenue. The original Nash company occupied this building and after a long period has taken it back. George C. Rose from Philadelphia, will manage the new branch. He has been a used car sales manager for 10 years.

The Gilman-O'Donnell Company, community Buick dealers, will occupy a new $30,000 building February 1, at Hennepin avenue and Twenty-sixth street, Minneapolis.

The T. W. Meikeljohn Co., Fond du Lac, Wis., one of the oldest and largest dealers in Ford and Fordson and tractor appliances and equipment in Wisconsin, is engaging in the manufacture of radio receiving sets.

The Avenue Motor Co., at Cleveland, formerly distributors of the Maxwell and Chalmers cars, have been appointed distributor of the Velie. The company succeeds the Matt J. Hinkle Motor Sales Co.

The Barton Motor Co., Burlington, Iowa, which has set a quota of 1,200 Fords for this year, banqueted 65 employes and its families at the Elks' club last week to inaugurate its selling campaign. W. K. Edmunds, general manager, and William Rheinhart, superintendent of the Des Moines Ford plant, were speakers. John F. D. Aue, publisher of the Burlington Hawkeye, was toastmaster.

The Ladehoff Motor Sales and Service Garage, Fourth street, Clinton, Iowa, has taken the Star and Durant lines, under the Rock Island distribution agency, for the Clinton territory.

Von-Nobel-Kruft Motor Co., 2404 Lisbon avenue, Milwaukee, has been appointed another community dealer for the Paige and Jewett by the Paige Wisconsin Co., state distributor, 539 Milwaukee street, Milwaukee.

The North Side Auto Co., Sheboygan, Wis., has been incorporated for $40,000 by Herman Trempe, Fred H. Poethig and Harvey Koehler, as a reorganization of the partnership business of the North Side Garage, 1320 North Thirteenth street, Sheboygan.

The Lauson Motor Co., Racine, Wis., Chevrolet dealer, has moved from Lake avenue and Fourth street to its new sales and service building, containing 25,000 sq. ft., at Sixth and Stannard streets.

Vincent & Vincent, Ford dealers, Phillips, Wis., have purchased the site of the former Hunt garage and will raze the building to make room for a new, fireprof sales and service building, 50x120.

Max Elkin, garage proprietor, Sheboygan, Wis., has filed a voluntary petition in bankruptcy, scheduling liabilities at $7579 and claiming assets of $213, with exemptions of $25.

V. A. Coleman, Waunakee, Wis., Gray and Studebaker dealer, will build a $25,000 garage and sales building, with service department, early in the spring.

Eau Claire Auto Supply Co. is a new Wisconsin corporation organized at Eau Claire, Wis., with $25,000 capital to engage in the wholesale and retail automotive equipment business. The incorporators are C. L. Dinkel, R. C. Bergh and J. L. Erity.

Klinger & Mayer Co., Watertown, Wis., Ford dealer, has changed into a Wisconsin corporation under the same name, with $40,000 capital. F. J. Klinger, A. J. Mayer and Max G. Kusel are the principals.

Byrne Bros., 3112 Burleigh street, Milwaukee, will build a one-story brick and concrete garage, 105x120 ft., on North avenue, between Eighteenth and Nineteenth streets.

W. A. Russell, 565 Park avenue, Kenosha, Wis., has plans for a $35,000 garage, sales and service building, 82x125 ft., two stories and part basement. Bids will be taken about April 1.

Kurz Motor Car Co., 1107 College avenue, Appleton, Wis., let contracts for a two-story addition, 75x50 ft., to its sales and service building.

Howard A. Stuzman of Carlock, Ill., and Arthur V. Baum, Eureka, Ill., have formed a partnership and opened a sales agency at 209-11 East Front street, Bloomington, Ill. They will distribute the Nash car in the central Illinois territory.

New officers for 1924 were elected at the annual meeting of the Galesburg, Ill., Automobile Dealers' Association, as follows: President, W. H. Callender; vice-president, E. A. Roberts; secretary-treasurer, Wallis Baird. Owing to the fact that the Armory can not be procured until early in the spring, it was voted to abandon the usual midwinter show and instead, each dealer will observe "automobile week" the second week of February. Each firm will put on a special display of cars during that period and will arrange special decorations and other attractions.

E. C. Clinkscales, Ford dealer at Columbia, Mo., gave a turkey dinner to his employes recently, 18 persons being present. Each of the employes was given a check for $25 as a present. Some of them have been with the firm for 10 years. The employes gave Mr. Clinkscales a handsome meerschaum pipe.

The Miller-Toher Co., 518 Harrison street, Davenport, Iowa, has added the Chandler line to its agency and has distributor rights in 17 counties. It plans a complete exhibit of Chandler cars early in February. The company also represents the Cleveland.

Edward H. Robinson, proprietor of the Robinson Auto Supply Co., 16 S. La Salle street, Aurora, Ill., paid $24,500 for a site at Clark and Broadway, for a three-story brick building to care for his expanding business. The main floor will be devoted to the accessory business, the second to garage and the top to storage. The work is not expected to begin for a year.

The Cincinnati Chevrolet Dealers Co. has been chartered with an authorized capital of $5,000 to promote co-operation among members toward the betterment of Chevrolet sales and service. Incorporators are R. L. Buse, J. S. Barrett, Edward P. Moulinier, Edna B. Finch and Cornelia Dewald.

The Cooke Chevrolet Co. has been organized and incorporated at Wadsboro, N. C., with a capital of $100,000, and will distribute the Chevrolet line in that section of the state. L. D. Robinson, Jr., E. M. Cooke, and other business men of Wadsboro are the incorporators.

Davis Chevrolet, Inc., of Baton Rouge, La., distributors of the Chevrolet line in Louisiana territory, are constructing a new two-story automobile building and service station that will be completed the early part of this year and occupied by the company as a permanent home.

The Fite Motor Co. is the name of a new firm in the automotive field organized recently at Hamilton, Ala., and has taken a Ford agency as authorized dealers in that section. The company has established modern salesrooms and a service station at Hamilton.

The Logan Motor Co. of Logan, Utah, has filed articles of incorporation. The capital stock is $25,000. Incorporators are G. S. Parkinson, Lyman E. Strong, L. H. Sorenson, Margaret Parkinson, Anna H. Sorenson and Gladys Strong.

A. H. Swan, manager of the Swan Service, Main street, Salt Lake City, for a local attorney, has gone to California. The business has been purchased by A. A. Jennings of Montana and the name changed to Zip Service. Battery and tire work is undertaken.

The Martindale Motor Corp. of Martindale, Tex., of which A. H. Smith is president, will erect a two-story brick garage in that city at a cost of $25,000.

G. W. Cox of Keystone, Okla., will rebuild an automobile building in that city, which was recently destroyed by fire.

A. Fassnacht & Sons of Chattanooga, Tenn., have awarded the contract for the erection of a brick and steel garage at a cost of $21,000.

The Citizens Automobile Co. of Chattanooga, Tenn., will erect a garage building on McCalie street.

The Clinch-Locust Garage Co. of Knoxville, Tenn., has announced that it will erect an automobile storage building at the corner of Locust street and Clinch avenue at a cost of $75,000, and that the building will have a capacity for 275 automobiles. It will be L-shaped, constructed of steel and concrete and will be two stories high.

The East Side Auto Co., 108 E. 5th street, Waterloo, Ia., and J. H. Caster, Inc., 1454 Main street, Buffalo, N. Y., have been appointed Cleveland dealers in their territories.

Recently appointed Nash dealers are C. M. Walker, Whittier, Calif.; De Bon Auto Co., Weed, Calif.; Ozee & Hayes, Mattoon, Ill.; Leach Bros. Garage, Castine, Me.; Nash Motor Car Co., Bessemer, Mich.; Husband & Anderson, Hesperia, Mich.; Nash Broadway Co., 1206 Broadway, Buffalo, N. Y.; A. J. Janecek Motor Sales Co., Merrick road, Lynbrook, L. I.; Sam & Jim's Garage, Woodbridge, N. Y.; Morland Nash Co., Salem, O.; Kline & Snell, Towanda, Pa.; Rudolph Motors Co., Carnegie, Pa.; J. Harry Swope, Darby, Pa.; East Berlin Garage, East Berlin, Pa.; West End Auto Sales Co., Mt. Carmel, Pa.

The distribution of the Moon automobiles in North Texas has been taken over by the South-

(*Continued on next page*)

(Continued from preceding page)
west Motor Company, the newest motor firm in Dallas, Texas. The new company is composed of E. L. McManamon and J. L. O'Rourke.

The Anson Motor Company of Anson, Texas, is to have a new salesroom and garage. Property was bought this week and a modern building will be erected immediately.

The Shelton Chevrolet Company of Dallas, Texas, composed of Ray Shelton, F. D. Thomas, George W. Owen, Jr., and others, and capitalized for $80,000, has been formed to take over the automobile business of the old Shelton-Perry Chevrolet company. The new company will distribute Chevrolet cars in North Texas and will sell them in Dallas.

A winter show of motor cars was staged by the dealers of Elgin, Ill., on Jan. 8 to 12. The display was given in the new garage building of the O. W. Mitchell Motor Car Company. Fifteen dealers participated, showing 40 of the late models. Special attention was paid to music and decorations and the attendance was large. O. W. Mitchell served as manager of the event.

The Horst-Streiter Motor Car Company, Elgin, Ill., has leased the building on Sixteenth avenue between Tenth and Eleventh streets, occupied for many years as a blacksmith shop and will remodel it into a garage and sales agency. The structure will cost about $10,000 and will be ready for occupancy about April 1.

Fred Schaffer, Chatsworth, Ill., has removed to a new building on Locust street and will carry on a sales agency and motor car repair business. The building formerly occupied will be torn down and replaced by a modern garage plant.

Necessity for enlarged quarters has forced the Goldberg-Samors Company, Streator, Ill., to rent a building on North Park street as a storage place for second hand cars. The new building was formerly occupied by E. S. Dance as a garage and sales agency.

Carl England, Morrisonville, Ill., purchased the Killum Brothers garage and sales agency at Farmersville, Ill., and took possession Jan. 1.

The Adams Motor Car Co., Waukegan, Ill., has been organized and has opened a sales agency at 118 Belvidere street. Capital stock has been fixed at $40,000. The promoters include H. J. Adams and J. J. Rudamacher. A repair shop and serivec station will be opened.

Harris, LeRoy & Clark, Inc., Broad and Poplar streets, Philadelphia, and Lancaster avenue and Church road, Ardmore, Pa., have been appointed Franklin car dealers for Philadelphia and immediately surrounding Pennsylvania territory.

The John Cherry garage and service station at Jacksonville, Ill., and 27 motor cars were destroyed by fire. Seventy-five motor cars were dragged out, thus keeping down the loss. The flames spread to adjacent buildings and threatened the entire city. The total loss is about $150,000, of which about one-third comprised the Cherry plant.

A new company was formed in Portland, Ore., to handle the Peerless line. It is known as the Peerless Motor Sales Co., and is composed of A. L. Williams and D. C. Williams, brothers, and E. R. Dalton. All three men are well known automobile men of Portland and A. L. Williams and Mr. Dalton have been selling Peerless cars for several years under the W. R. Delay Motor Co. and the Durant-Stevens Motor Co., former distributors. The company is located in a new building just completed at the corner of Thirteenth and Morrison streets.

S. Krendick, for many years with the Firestone Tire & Rubber Co., at Akron, O., has embarked in business for himself at 1306 South Adams street, Peoria, Ill. He will specialize in tires, but will handle other motor vehicle accessories and also take care of vulcanizing.

George Hoerr, 506 Green street, Peoria, Ill., has taken the distribution of the Chevrolet car and will also operate a Chevrolet service station.

W. C. Merritt purchased the motor vehicle accessory store of Edward Troller, 109 South Second street, Rockford, Ill., and took possession Jan. 10. He was formerly in partnership with P. E. McFarland in that city as distributor of the Marmon car and has also been engaged in the motor car accessory business in that city for a number of years. In his new venture, he will specialize in Ford parts and accessories.

The Robinson Auto Supply Co., Elgin, Ill., has purchased property at 406 Ann street, that city, and will erect a building to house the concern, the need of larger quarters being felt for some time. The Robinson company also has a branch in Aurora, Ill.

Charles E. Whitehurst, Springfield, Ill., dealer in motor cars, has filed a petition in bankruptcy. He listed liabilities of $9779 and assets of $3225.

Beatty & Sons garage at Atwood, Ill., was destroyed by fire on Jan. 3. Twenty-six motor cars and one tractor were in the structure and are a total loss. The structure and contents was valued at $40,000, partly covered by insurance.

CONCERNING MEN YOU KNOW

H. D. Eirman of the sales department of the Steel City Automobile Co., Pittsburgh, Feerless distributors, has been promoted to the post of sales manager and is now in charge of the retail and wholesale business of the company.

Bryce Blackley, formerly connected with the Chase Motor Car Co. and the Syracuse Motor Car Co., Syracuse, New York, died at his home in Watertown Thursday. He was general manager of the DeFriend Motor Co. at Watertown for three years.

Frederick P. Bentley has been named manager of the used car department of the Syracuse Motor Car Co., Syracuse, N. Y., Maxwell-Chalmers distributors here. He was formerly with the Henshaw Car Co. in Boston before coming to Syracuse.

A. L. Smith, one of the star salesmen of the Botterill Automobile Co., Salt Lake City, Utah, and well known in automobile circles of the city, has been placed in charge of the wholesale sales department of the company. He succeeds Fred L. Brown, who has taken a similar position with the H. O. Harrison Co., of San Francisco, Calif.

J. H. Little, director of purchases of Durant Motors, Inc., and for the past ten years associated with Mr. Durant, both in his present organization and General Motors, has been granted a leave of absence in order to accompany Mrs. Little, who is ill, to lower California, where he will take up his residence temporarily.

R. W. J. Harris, for many years an employe of the Vermilion Malleable Iron Co., Rock Island, Ill., has been appointed general manager for the company, succeeding Fred Stiehl, recently resigned. George Merritt is now superintendent of the plant and W. L. Berkey superintendent of the finishing department.

Harvey S. James has been appointed manager of the Joplin, Mo., division of the Automobile Club of Missouri to succeed Paul D. Hammacher. The membership of the Joplin division has reached 312.

F. L. Lamson has been appointed sales manager of the Norwalk Tire & Rubber Co. Mr. Lamson has been treasurer of the company since its formation in 1914 and has been identified with the rubber industry for the past 14 years, first with the Diamond Rubber Co. and later with the B. F. Goodrich Co.

R. V. Davis, who has been selling Vitalic tires, tubes and accessories in the southern states, succeeds E. G. Davidson as manager of the Chicago branch of the Continental Rubber Works. Mr. Davis has been on the Continental staff for the past 10 years.

Hays McFarland, formerly vice-president in charge of sales for the Bassick Manufacturing Co., has joined Blackett & Sample, Inc., advertising agency, 58 East Washington street, Chicago, and hereafter the firm will be known as Blackett, Sample & McFarland.

Alvord Reamer & Tool Co., Millersburg, Pa., announce the appointment of A. M. Roper as general sales manager of their automotive division. Mr. Roper was formerly secretary, treasurer and general manager of Roper, Harris & Dunn Co., Greenville, Tex.

F. C. Proctor, for years owner of the Plaza Garage, Chicago, and one of the oldest members of the Chicago Garage Owners' Assn., was buried Thursday, Jan. 17.

A. C. Stevens, a prominent dealer in Portland, Ore., for some years, and distributor for the Winton, Haynes and Earl, has announced his retirement from the automobile business. The three lines are unrepresented here, for the present, as a result. The Therkelson Motor Co., Rickenbacker distributors, has moved into the location formerly occupied by Stevens.

Howard H. Haile has been named sales manager of the entire Buffalo (N. Y.) Studebaker dealership. He is a member of the firm of the A. W. Haile Motor Co.

C. M. Bunnell has been named as manager of the Off-N-On skid chain sales department of the Pyrene Manufacturing Co. Mr. Bunnell has been general sales manager of the Torrington Co., of Torrington, Conn., for many years, previous to which time he had charge of the automobile lamp department of the General Electric Co.

Alfred L. Wendover, of Mount Vernon, N. Y., has been appointed manager of the New York branch of the Dunlop Tire & Rubber Co. Mr. Wendover has been in the tire industry since 1906, starting with Morgan & Wright, joining the United States Rubber Co. in 1910, continuing with that concern until his recent change to Dunlop.

C. H. Davies, manager of the factory division of S. F. Bowser & Co., in Chicago, has assumed charge of the factory sales promotion division of the entire Bowser organization, with headquarters in Fort Wayne, Ind. Mr. Davies relieves L. E. Porter, assistant general manager, of this branch of promotional work and now works in collaboration with T. D. Kingsley, general sales manager.

W. F. Frei has been made sales manager for the L. L. Farrish Motor Co., Seventh and Franklin streets, St. Paul. He has been with the John F. Gehan Motor Sales Co., and for several years was with the Kelly Automobile Co. in Minneapolis. He will deal in Rollin and Duesenberg cars.

A. Warren Cahill, wholesale manager, Jesse A. Smith Auto Co., Milwaukee, distributor of the Hudson and Essex, died Jan. 5 from the effects of an operation for goitre. He was 40 years of age and was connected with the automotive trade in Milwaukee over 15 years. Mr. Cahill was a brother-in-law to Jesse A. Smith, president of the Smith company.

R. G. Foster, assistant manager International Harvester Co. branch at Madison, Wis., has been transferred to the Davenport (Ia.) branch as assistant manager. J. C. Johnstone of Davenport assumes similar duties in Madison.

James T. Bray, chief road man, Ford Motor Co. Milwaukee branch, has been advanced to the position of general representative of the Ford in Cuba, with headquarters in Havana.

David Bussey, who was the first Ford dealer in Atlanta, and among the first automobile dealers in the city, has disposed of his agency in that city and taken an exclusive franchise to handle the Ford and Lincoln at Griffin, Ga.

H. J. Lee has been appointed sales manager for the S. R. Blockson Co., 667 North Broad street, Philadelphia, distributor of Stutz cars. He was formerly sales manager for the Coburn Motor Car Co., distributors of Studebaker cars in Norfolk, Va.

E. B. Gunter, Jr., who has been connected with the Anderson Motor Co., Rock Hill, N. C., has accepted a position as factory representative with the Chevrolet Motor Co., Charlotte, N. C.

Harry L. Snyder has been elected president of the Danville, Ill., Motomart Association, recently organized under the Appleby plan to handle used cars. Daniel W. Beckwith has been chosen secretary-treasurer. A committee has been appointed to co-operate with the officers in launching the new association.

Howard W. Harrington, for five years advertising manager of the Moline, Ill., Plow and Tractor Co., has resigned to take a position with an advertising agency in Cleveland, Ohio. He has been succeeded at Moline by M. O. Dawson.

John L. Grice has been appointed manager of the White Motor Co., St. Louis district, comprising most of the state of Missouri and the southern part of Illinois. He succeeds Eugene Kelly, who has been elected a vice-president of the Coca-Cola Co.

A. G. H. Jenssen, formerly in charge of the Garford Motor Truck sales, Toledo, has become associated with the Landman-Griffith Co., to take charge of the commercial car department of the Maxwell and Chalmers distributors for this territory.

H. A. Blyth has retired from the active management of the Marmon-Cleveland Co. and he has been succeeded by J. N. Wolfinger, vice-president and general manager. Mr. Wolfinger was associated with the Packard-Cleveland Co. for a number of years as sales manager. Mr. Blyth retired on account of ill health and the pressing demands of personal affairs on his time.

George H. Cox has severed his connection with the Willys-Overland Co. after six years' service as manager of the Kansas City branch. For two years prior to this he was assistant director of branches.

Edward E. McCoy, president of the Rees Manufacturing Co., of Pittsburgh, Pa., has been elected director and vice-president of the Third National Bank of Pittsburgh. Mr. McCoy remains as the active head of the Rees company in addition to handling the new duties of his position with the bank.

Russell P. Taber, president of Russell P. Taber, Inc., Hartford, Conn., distributor of Reo and Peerless, has been elected treasurer of the Connecticut fair association which conducts the annual fair at Charter Oak Park.

C. P. Clark, recently appointed district representative on the Pacific coast for the National Automobile Chamber of Commerce, will establish his headquarters in San Francisco. He will cover Washington, Oregon and California for the national body, and his work will include an analysis of economic, industrial and market conditions, for the benefit of automobile manufacturers in making up their production schedules.

BUSINESS NOTES

The Ko-Mo Supply Co., Charlotte, N. C., has changed its name to Glasgow-Stewart & Co. The change is in name only as Thomas M. Glasgow, president, and T. R. Stewart, secretary and treasurer, have been members of the company for some years. The company, an automotive equipment jobber, is a member of the Automotive Equipment Association and the Southern Automotive Equipment Jobbers Association in both of which Mr. Glasgow has been an active committee worker.

The Gray Auto Equipment Co., Oakland, Calif., has been incorporated with a capital of $150,000 by officials of the Oakland Machinery Co. to manufacture automobile bumpers, luggage carriers and other accessories, which, prior to this time, have been handled as a side line by the Oakland Machinery Co. Arrangements have been made with the Judson Iron Works to install special rollers to roll spring steel here for the new equipment company.

The Blake Piston Ring Co., Cleveland, O., has been chartered with an authorized capital of 100 shares, no par value designated, to manufacture, sell and deal in piston rings. Incorporators are John T. Blake, Joseph M. Blake, W. A. Summit, P. B. Belden and P. Rowland.

The Demountable Auto Rim Manufacturing Co. of Illinois is planning to establish its factory in Moberly, Mo., and has taken up the matter with the Chamber of Commerce. The company was organized in Illinois in 1922 with a capital of $250,000. The concern manufactures a demountable rim, the invention of Frederick Lee Todd and also an automobile tool for which Edward R. Robinson, of Chicago, another member of the firm, has the basic patent.

Joseph Teipel, F. G. Langbein and W. F. Exner, formerly connected with the Mancha Storage Battery Co., have organized the St. Louis Steel Casting Co., at 3432 Potomac street, St. Louis.

The Garford Truck Co. has opened a new factory branch in Atlanta at 330 Peachtree street, making Atlanta the southern distributing center. Louis H. Hyneman, formerly of the Newark, N. J., branch, has been transferred to the new Atlanta branch as manager.

Announcement has been made that the Rote Leather Products Co., Akron, occupying the former Phoenix Rubber Co. plant, will start production on imitation leather within the next month.

Amendments to corporate articles have been filed by the American Plier & Tool Corp., Milwaukee, whereby the title is changed to Master Plier Corp. The change is made to better identify the concern with the trade name of its principal product. Walter S. Bronk is secretary of the company.

The Wausau Abrasives Co., Wausau, Wis., one of the largest western manufacturers of abrasives for the metal and woodworking industries, is effecting a material enlargement of its capacity by the erection of a manufacturing addition costing about $75,000.

Manufacture, sale and repair of machine tools, machinery, mechanical appliances, metal parts and units, will be undertaken by the Nationl Machine Tool Co. of Racine, a new Wisconsin corporation capitalized at $20,000. The principals are Paul Kramer, Robert Henrich and Oswald Reiche, all of Racine.

The Walker Mfg. Co., Racine, Wis., automobile jacks, presented each of its 350 employes with a group life insurance policy in the Equitable, originating at $500 and accumulating at the rate of $100 a year until a maximum of $1500 is reached.

The S. C. Johnson & Son Co., Racine, manufacturing waxes, finishes, varnishes, etc., distributed $73,000 in holiday bonus checks among its employes, numbering 300. The bonus is based on years of service and salary or wage. This was the sixth consecutive year in which the bonus payment has been made.

The Auto Truck Service Co., 308-316 North avenue, Milwaukee, has amended its corporate articles to gain authority to enter the field of manufacturing motor truck bodies, hoists and other appliances. The concern has been selling and servicing motor trucks and in recent years developed several new designs of special truck bodies and mechanical hoists as the result of its service experience.

Motor Car livery companies are springing up all over Illinois. Cars are rented, the companies furnishing drivers, or the patrons can drive the cars themselves. The Auto Rental Company, of Danville, Ill., has been incorporated with capital stock of $5,000. The promoters include C. W. Myers, O. W. Winters and W. J. Grant. An office has been opened at 22 South Hazel street.

Portland has been named northwestern district headquarters for the Mason Tire & Rubber Co. and the Pacific northwest has been designated as a separate district, according to word from the factory this week. The company has maintained a branch in Portland heretofore, handling Oregon and Washington business from here, but the branch has been under the direction of the San Francisco office. Under the new ruling Portland is northwestern district headquarters, with jurisdiction over Oregon, Washington, Idaho and northern California. Catlin Wolfard, who has been branch manager, has been named manager of the new district.

The Ramspring Bumper Co. has moved its factory and offices to 5025 Wabash avenue, Chicago.

The Multibestos Co., manufacturer of brake linings, has opened a branch in its own building at 1241 South Michigan avenue, Chicago. This will facilitate handling rapidly increasing sales.

The Milwaukee Die Casting Co., 297 Fourth street, Milwaukee, has increased its authorized capitalization to $50,000 common and $150,000 preferred stock, in order to accommodate the rapid increase in its business and provide for further expansion of production. The concern is a large manufacturer of die cast engine bearings as well as other metal products for the automotive industries.

The Master Auto Body Co. is the new title selected by the Benzick-Schulner Body Corp. of Milwaukee, which has recently filed amendments to its articles to provide for the change in corporate style.

Percival B. Hustis, long prominent in the Milwaukee automotive trade, and formerly associated with the Case, Stevens-Duryea, Rauch-Lang electric and other lines, has filed a voluntary petition in insolvency in the Milwaukee Circuit court. A hearing to determine the assignment has been called for March 15 at 10 A. M.

The orders received by the General Electric Co. for the year ending December 31, 1923, amounted to $304,199,746, compared to a total of $242,739,527 for the year 1922, or a gain of 25 per cent, according to a recent announcement by Gerard Swope, president of that concern. For the fourth quarter of 1923, orders totalled $74,452,442, as compared with a total of $66,568,333 for the corresponding quarter in the year 1922, or a gain of 12 per cent.

The Georgetown Motor Co., of Georgetown, Texas, has been incorporated. The capital stock is $35,000. Among the incorporators are B. M. Barker, Mrs. Lucile Barker and H. E. Bertram.

The Bessemer Motor Truck Co. has ceased operations at Grove City, Pa., following the consolidation with the American Motors Co., of Plainsfield, N. J. All the local manufacturing products of the Grove City plant have been shipped to New Jersey with the exception of about five carloads which will go forward presently. R. M. Russel, of the purchasing department, I. M. Lewis and W. H. Shellito, of the sales, and C. O. Keller, of the engineering department, will go to Plainfield to take position with the new company.

An upholstery department for automobiles has been added by the Iowa Implement Co., of Clinton, Ia., with E. P. Jones, formerly of Rock Island, Ill., in charge.

V. A. Van Horn, sole owner of the Fitch Four Wheel Drive Tractor Co., now located at Big Rapids, Mich., is holding a series of conferences with the officers of the Chamber of Commerce of Aurora, Ill., with a view of removing the plant from Michigan to Illinois. The motors of the company are manufactured in Clinton, Iowa, and it is desired to secure a location somewhere between that city and Chicago. Several sites in Aurora were inspected and proved satisfactory and, if sufficient encouragement is given by the Aurora business men, the plant will be moved.

Papers have been filed with the secretary of state increasing the authorized capital of the David Motor Car Co., Canton, O., from $50,000 to $250,000, in order to take care of the increasing business of the concern.

TO HOLD SHOW

FAIRFIELD, Ia., Jan. 22.—An automobile show will be held here at the armory Feb. 14-16, under the auspices of the local dealers.

1923 Greatest Year for Ft. Worth Dealers; '24 Promising

$750,000 Worth of New Automotive Buildings Started in Past Twelve Months

FORT WORTH, Tex., Jan. 17.—Automobile dealers in Fort Worth had a prosperous year in 1923 and they are preparing for a more prosperous one in 1924. The sales by the dealers in Fort Worth in 1923 were the greatest in the history of the city. The first 15 days of the opening month of the new year saw the brisk business of the old year continuing. It appeared the trade would continue brisk for some weeks.

Probably the best indication of the prosperous business in 1923 and the expected trade in 1924 is seen in the $750,000 worth of new automobile firm homes or improvements launched this year or to be started in a few days. The expansion in automobile circles in Fort Worth in 1924 will certainly pass the $1,000,000.

Some of the larger buildings contracted for or contemplated are:

Percy Garret Motor Company, new home, $200,000.

Fred H. Jones, new three story building, $200,000.

Earle North Motor Company, new additions, $75,000.

Beck Automobile Company, alterations and repairs and additions, $50,000.

Work is being rushed on a score of smaller repair and alteration jobs and on a dozen filling stations, which will easily bring the total amount involved in new buildings for automotive purposes now under way or to be started in 30 days above the $750,000 mark.

There is an internal growth in the business at Fort Worth. There are several new faces on the sales staffs of established dealers and some changes in managements. The spirit of sales courtesy is growing and everything along the row is lining up, pulling together for the biggest year in the history of the game.

Fort Worth distributes cars in some of the richest sections of the state. It has the "oil belt" territory and the sales of the Fort Worth dealers run into millions annually.

NEW SPRINGFIELD OFFICERS

SPRINGFIELD, Ill., Jan. 17.—New officers were elected for the coming year at the annual meeting of the Springfield Automobile Dealers' Association, as follows: President, R. E. Haas; vice-president, J. L. Elliot; secretary, W. G. McCloskey; treasurer, C. R. Constant. It was voted to change the dates for the winter show, originally selected for March, to Jan. 24, 25 and 26. The show will take place at the state arsenal. Basil Ogg has been engaged as manager and has been in Chicago arranging for several features of a musical and vaudeville nature as side attractions. The decorations will also be upon a more elaborate scale than in former years. Twenty-six dealers will occupy the available space.

COMING MOTOR EVENTS

AUTOMOBILE SHOWS

Akron, Ohio	February	Automobile Dealers Co., Frank O. Neil, Manager.
Albany, N. Y.	Feb. 16-23	Albany Automobile Dealers' Association, J. B. Wood and L. Y. Long, Managers.
Albuquerque, N. M.	Feb. 7-9	Albuquerque Automobile Trade Association. E. G. Fuhrmeyer, Secretary.
Allentown, Pa.	March 1-8	Lehigh Automobile Trade Association. E. T. Satchell, President.
Atlanta, Ga.	Feb. 16-24	Atlanta Automobile Association, Virgil W. Shepard, Manager.
Atlantic City, N. J.	Feb. 2-9	Annual Atlantic City Automobile Show. E. M. Antrim, Chairman.
Baltimore	Jan. 19-26	Baltimore Automobile Dealers' Association, John E. Raine, Secretary.
Beaver, Pa.	Jan. 23-26	Beaver County Automobile Dealers Association. James W.
Bethlehem, Pa.	March 23-29	Lehigh Valley Automobile Show.
Binghamton, N. Y.	Feb. 4-9	Annual Show, L. M. Napper, Chairman.
Boston, Mass.	March 8-15	Boston Automobile Dealers' Association and the Commercial Motor Vehicle Association, Chester I. Campbell, Manager, 5 Park Square.
Brooklyn	Jan. 19-26	Brooklyn Motor Vehicle Dealers' Association.
Burlington, Vt.	April 2-5	Ethan Allen Club, Thomas W. Parkhill, Chairman.
Calumet, Mich.	April	Central Storage Co., Jos. A. Savini, Manager.
Camden, N. J.	March 3-8	Camden Automobile Trades Association, M. T. Ivins, Manager.
Charlotte, N. C.	March 3-8	Charlotte Automotive Trades Association, George E. Wilson, Chairman.
Chicago	Jan. 26-Feb. 2	N. A. C. C. National Show, Coliseum and First Regiment Armory, S. A. Miles, Manager.
Chicago	Jan. 26-Feb. 2	Annual Salon, Drake Hotel.
Cincinnati	Feb. 9-16	Cincinnati Automobile Dealers' Association, Harry T. Gardner, Manager.
Cleveland	Jan. 19-26	Cleveland Automobile Dealers' and Manufacturers' Association, Herbert Buckman, Manager.
Columbus, Ohio	Feb. 4-9	Columbus Automobile Dealers Co., Anson B. Coates, Manager.
Dallas, Tex.	Feb. 11-17	Dallas Automobile Trades Association.
Deadwood, S. D.	Feb. 19-23	Deadwood Business Club, F. R. Baldwin, Manager.
Denver, Colo.	March 11-15	Denver Automobile Dealers' Association, F. F. Vic Roy, Manager.
Des Moines, Ia.	Feb. 25-March 1	Des Moines Automobile Trades Association, C. G. Van Vleit, Manager.
Detroit, Mich.	Jan. 19-26	Detroit Automobile Dealers' Association, H. H. Shuart, Manager.
Elmira, N. Y.	Jan. 21-26	Elmira Automobile Merchants' Association, T. W. Keeton, Manager.
Fairfield, Ia.	Feb. 14-16	Automobile dealers Show, Harry Brown, Secretary.
Goldsboro, N. C.	April 21-26	Chamber of Commerce, W. C. Denmark, Manager.
Grand Rapids, Mich.	Feb. 25-March 1	Passenger Car Dealers' Association, M. D. Elgin, Manager.
Great Falls, Mont.	March	Montana Automobile Distributors' Association, Lyman E. Jones, Manager.
Green Bay, Wis.	Aug. 25-30	Automotive Division, Association of Commerce, W. F. Kerwin, Manager.
Greenville, S. C.	Feb. 25-March 1	Greenville Chamber of Commerce.
Hackensack, N. J.	Jan. 12-19	Automotive Trade Association of Bergen County, Moe Katzman, Manager.
Hartford, Conn.	Feb. 16-23	Hartford Automobile Dealers' Association, Arthur Fifoot, Manager.
Huntington, W. Va.	Feb. 24-29	Huntington Automobile Dealers' Association, G. B. Roberson, Manager.
Indianapolis	March 3-8	Indianapolis Automobile Trade Association, John B. Orman, Manager.
Kansas City, Mo.	Feb. 9-16	Kansas City Motor Car Dealers' Association, George A. Bond, Secretary.
Lima, Ohio	Feb. 19-23	Lima Automobile Merchants Association. R. H. Phillips, Managers; W. H. Powell, Secretary.
Louisville, Ky.	Feb. 18-23	Louisville Automobile Dealers' Association, George T. Holmes, Secretary.
Madison, Wis.	Feb. 7-10	Madison Automotive Dealers' Association, O. S. Jacobson, Chairman.
Mankato, Minn.	Feb. 27-Mar. 1	Mankato Automobile Dealers' Association. E. J. Dillman, Secretary.
Middletown, N. Y.	Feb. 5-9	Middletown Automobile Dealers' Association, Callahan and Partlan, Managers.
Milwaukee	Jan. 19-26	Milwaukee Automotive Dealers' Association, Bart J. Ruddle, Manager.
Milwaukee, Wis.	Aug. 25-30	Milwaukee Automotive Dealers' Association, Fall Show, Bart L. Ruddle, Manager.
Minneapolis, Minn.	Feb. 2-9	Minneapolis Automobile Trade Association, Walter R. Wilmot, Manager.
Montreal, Canada	Jan. 19-26	Montreal Automobile Trade Association.
Muskegon, Mich.	March 4-8	Muskegon Automobile Trade Association, J. C. Fowler, Manager.
Oklahoma City, Okla.	March 24-29	Oklahoma City Motor Car Dealers' Association, E. T. Bell, Secretary.
Omaha, Neb.	Feb. 18-23	Omaha Automobile Trade Association, A. B. Waugh, Manager.
Orlando, Fla.	Feb. 12-16	Subtropical Midwinter Fair Association, C. E. Howard, Manager.
Patterson, N. J.	Jan. 28-Feb. 2	Patterson Automobile Trade Association. Harry Durkin, Manager.
Portland, Me.	Feb. 25-March 1	Portland Automobile Dealers' Association, Howard B. Chandler, Manager.
Portland, Ore.	Feb. 9-15	Automobile Dealers' Association of Portland, Ralph J. Steahli, Manager.
Racine, Wis.	Feb. 7-10	The Racine-Journal News.
Rochester, N. Y.	Jan. 21-26	Rochester Automobile Dealers' Association, S. Park Harman, Manager.
Sacramento, Cal.	Sept. 1-10	State Agricultural Society, C. E. Paine, Manager.
Saginaw, Mich.	March 4-8	Saginaw Automobile Dealers' Association, Guy S. Gauber, Manager.
San Francisco	Feb. 16-23	San Francisco Automobile Dealers' Association, G. A. Wahlgreen, Manager.
Scranton, Pa.	Jan. 31-Feb. 2	Scranton Motor Trades Association, Truck Show, Hugh B. Andrews, Manager.
Scranton, Pa.	Feb. 4-9	Scranton Motor Trades Association, Automobile Show, Hugh B. Andrews, Manager.
Sioux Falls, S. D.	Feb. 6-10	Sioux Falls Automobile Association, John P. Blug, Manager.
Springfield, Ill.	Jan. 24-26	Springfield Automobile Dealers' Association, Basil W. Ogg, Manager.
Springfield, Mass.	March 3-8	Springfield Automotive Dealers' Association, Harry W. Stacy, Manager.
St. Louis	Feb. 17-24	St. Louis Automobile Dealers' Association, Robert E. Lee, Secretary.
Syracuse, N. Y.	Feb. 25-March 1	Syracuse Automobile Dealers' Association, C. H. Hayes, Manager.
Toledo, Ohio	Feb. 4-9	Toledo Automotive Trades Association, H. V. Buelow, Manager.
Toronto, Ont.	Aug. 23-Sept. 6	Canadian Automotive Equipment Association and the Automotive Industries of Canada, Gib Robertson, Secretary.
Troy, N. Y.	Feb. 2-9	Troy Automobile Dealers' Association, Frank M. Baucus, Manager.
Washington, D. C.	March 8-15	Washington Automotive Trade Association, Walter Lambert, Secretary.
Washington Hgts., N. Y.	March 26-31	Washington Heights Automobile Dealers' Association, H. G. Stiles, Manager.
Wilmington, Del.	Jan. 28-Feb. 2	Wilmington Automobile Trade Association, Daniel P. Buckley, Chairman.
Yonkers, N. Y.	March 3-8	Automobile Merchants' Association of Yonkers, Callahan and Partlan, Managers.
Youngstown, Ohio	Feb. 25-March 1	Youngstown Automobile Dealers' Association, C. A. Baird, Manager.

CONVENTIONS

Albuquerque, N. M.	May 26-31	U. S. Good Roads Exhibition.
Chicago	Jan. 29-30	Annual Convention of the National Automobile Dealers Association.
Chicago	Jan. 30-31	Annual Meeting of the Automotive Electrical Service Association.

The READERS' CLEARING HOUSE

Questions & Answers on Dealers' Problems

Removing Timing Gears Without a Puller

Q—Your article on page 45 of the Dec. 20 issue of MOTOR AGE in regard to installing new timing gears in a 1921 Oakland was exactly what I wanted to know. I would also like to know how to remove the old gears if you have no puller to fit and how to get the generator drive shaft bushing out. Are the new gears marked so that you can get the engine timed right? Also advise if there is any difficulty in replacing the bushing.—David H. Cressman, Springtown, Pa.

The camshaft gear is removed by first taking the camshaft out which requires loosening the set screw at the front bearing. After the camshaft has been removed the gear may be taken off by using an arbor press. If no puller is available for the crankshaft gear you can use a couple of pinch bars and then strike the end of the crankshaft with a lead hammer while pressure is maintained on the pinch bars to pry the gear off of the shaft.

The generator is removed by taking out the three screws which attach the generator flange to the engine. The gear will come out with the generator. Then remove the gear from the generator shaft and take off the end bracket. An arbor press or a hammer and piece of brass the same size as the bronze bushing can be used to remove the bushing.

Good workmanship is necessary to properly install the new bushing. It should be pressed into place and so located that the armature will have but a slight amount of end play. It is then necessary to ream it in order that the armature shaft will fit properly. Concerns equipped to do this work will probably have a line reamer which goes through from the other end of the generator so as to insure proper alignment of the two bearings.

For this reason and also due to the fact that you may have trouble on account of not having the right puller we would suggest your getting in touch with the local Oakland service organization or else with the organization in Philadelphia.

The new timing gears are supposed to be marked but we would suggest that you do not depend on the marking. The exhaust should close 7.5 degs. after top dead center which will be approximately when the piston has gone to its top position and then has gone down from 1/64 to 1/32 inch. The intake opens 17.5 degs. after top dead center.

When the engine is reassembled you should also check the ignition timing and in the retard position of the levers with the piston up on dead center the interrupter points should be ready to open.

The Readers' Clearing House

THIS department is conducted to assist dealers and maintenance station executives in the solution of their problems.

All questions are answered direct by letter, so the name and address should be given in full. This saves waiting for the answer to be published, which sometimes occurs several weeks late, depending upon the space available.

Readers' names will not be published with articles, if a request to this effect is received with the letter.

Inquiries not of general interest will be answered by personal letter only. Emergency questions will be replied to by letter or telegram.

Also state whether a permanent file of MOTOR AGE is kept, for many times inquiries of an identical nature have been made and these are answered by reference to previous issues.

Addresses of business firms will not be published in this department but will be supplied by letter.

Technical questions answered by B. M. Ikert, P. L. Dumas and A. H. Packer; Legal, by Wellington Gustin; Paint, by G. King Franklin; Architectural, by Tom Wilder; Tires, by a Practical Tire Man; General Business questions, by MOTOR AGE organization in conference.

TIMING A 1919 MODEL Z 4 CYL. HENDERSON

Q—Would like to have correct timing diagram for 1919 model Z Henderson 4 cylinder motorcycle engine.—Hee Tong, Honolulu, T. H.

The flywheel on this model has marks for checking the timing and these marks may be seen by removing an inspection plug in the top of the flywheel housing. It is also necessary to have the front cover of the crankcase removed. The engine should be turned left hand or anti-clockwise, which is the normal running direction, until the marks Ex. C. (exhaust close) show up under the inspection opening. At this same instant the exhaust valve in either the No. 1 or No. 4 cylinder should have gone up and should have come down again, just reaching its lower or closed position at the instant that the marks show up at the inspection opening.

If the timing is not correct it is necessary to disengage the camshaft gear from the crankshaft gear. This may be done by sliding the crankshaft or the camshaft off, the one to slide being the one that comes off the easiest. In some cases it may be desirable to notice how much the timing needs changing, that is, how many teeth it needs to be shifted, and then do so by pulling the camshaft out, leaving both gears in place on their shafts.

To do this requires releasing the valve springs and lifting the tappets up so that the camshaft may be withdrawn after backing off the set screw at the front bearing. In timing the spark, the flywheel should be turned back against the normal direction of rotation until the letter "S" appears at the inspection opening. At this position of the crankshaft the magneto, set in the retard position, should be connected up. When the engine is in the position for the No. 4 exhaust valve to close it is approximately in the right position for the No. 1 spark plug to fire.

TIGHTLY FITTING PISTONS MAY REDUCE ENGINE SPEED

Q—We have a model M 4 Monroe motor 3¼ in. bore equipped with Lynite pistons and balanced crankshaft. We installed light weight cast iron pistons and it seems to have more vibration and less speed. This crankshaft seems to have very large counterbalances. Would it be possible to grind them down a little on one side as the piston cannot be removed without dropping the crankshaft? What would you suggest?—R. L. Wilhelm, Athol, S. Dak.

It is possible that the pistons installed, while light compared to other cast iron pistons, are actually heavier than the ones formerly used. This you could have determined at the time the pistons were installed. It is also possible that the pistons put in differ somewhat in weight so that one is heavier than another. Such a condition will cause vibration in an engine.

The reduction in speed may be due to fitting the pistons and rings rather tightly and until they work freely in the cylinders you may not be able to get the speed formerly attained. To check this you can run the car until the engine is hot and then stop both the car and the engine and try the engine with the crank. If it will not spring back, due to compression, when the crank is turned, it shows that the pistons are still tight in the cylinders.

We would not recommend your tampering with the crankshaft as you would have a great deal more work to do than you figure on and would also get the crankshaft out of balance even if you were successful in cutting away enough material so that the pistons would go by.

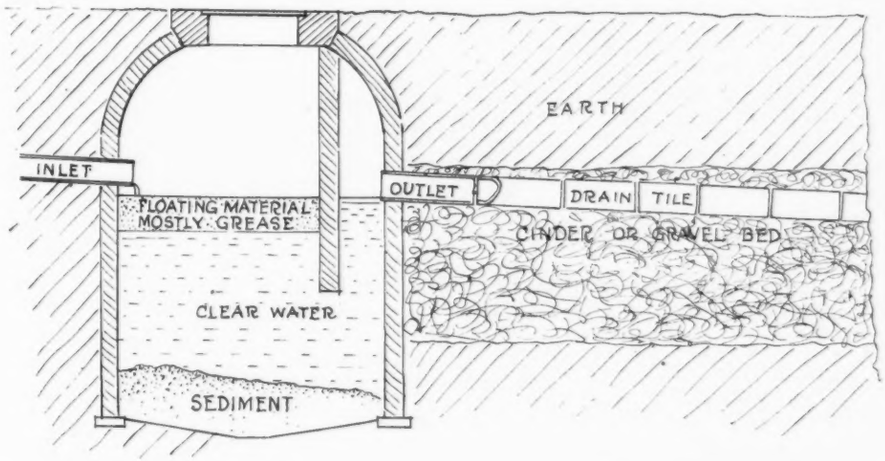
Catch Basin for Drainage From Wash Rack

Q—Please, at your earliest convenience send plans for grease and wash rack and also how sewerage should be handled where cesspool has to be used. Tell us whether a single or double pool will be necessary to take care of the sewerage.

Thanking you in advance for any information you may be able to furnish.—Lankershim Service Station, Lankershim, Calif.

We are enclosing plans for a greasing rack and wash rack, as requested in your letter of December 24, and are also enclosing a sketch showing the approved method of building a septic tank or cesspool to take care of sewerage. These tanks are built very much as catch basins but are very much larger, probably 6 or 8 feet in diameter. A drainage bed of cinder or gravel will vary according to the condition of your soil. If it is of clay and very hard, you will need a considerable larger bed than if it is light dirt or sandy.

You will note in the construction of the tank that there is a partition across one side with an opening that extends up from the bottom perhaps half way to the surface of the water. This partition keeps grease and floating material from escaping through the outlet and sediment and heavy material falls to the bottom and remains there. Only the clear water which is separated from the mixture is allowed to escape.



BATTERY DESIRABLE FOR CONTINUOUS SERVICE WITH ISOLATED LIGHTING PLANT

Q—We have been reading MOTOR AGE for several years and would like some information on an electrical lighting system for a garage we are starting. We intend to install a 6 K. W. 110 V. D. C. generator for lighting the garage and will also furnish current for lighting store, building and residences.

We have a Chevrolet 490 engine and wish to use this for running the generator, which requires 10 h.p. at 1100 r.p.m. Can you tell us at what speed the Chevrolet engine will have to run to develop 10 h.p., and also advise as to whether a governor could be used to maintain the proper speed as the load increases. If a governor is feasible kindly advise where one may be obtained.

We would like your opinion as to the way such a system would operate, and if it will not handle the 6 K. W. generator would like to know if it would handle the 3 K. W. generator.—Alfred E. Teller, Orange Grove, Tex.

We will give by letter the name of a concern which can supply a governor. There is, however, some disadvantage in having the generator only as a source of current for it means that if the engine ever stops all of the lights in the office, store, garage and residences will go out. Where a number of power plants are operating to supply current to a town it is a satisfactory system for spare units are always available, and if it is necessary to shut down one, another one is started to take its place.

We think it would be much better if you would get 58 large storage battery cells, each a 2-volt cell, so as to give a nominal voltage of 116. Possibly 55 would do, giving a nominal voltage of 110, but we happen to know of one installation where 58 give satisfactory results. Such a battery, of course, is quite expensive, but it will last for several years and makes it possible to have the plant shut down whenever the load is rather small, which is quite an advantage.

As far as the power of the engine is concerned, we believe that it is just about right and will deliver close to 10 h. p. at 1100 r.p.m. Without a battery system, if your load should vary from nothing up to 10 h. p. you would have to have an engine cable of delivering 10 h. p. in order to carry the peak of the load.

However, if you had a battery system the engine could operate, delivering an average of 5 or 6 h. p., and the battery would absorb the excess and take care of the overload, thus relieving the engine. This would give a longer life to the engine, for it would be operating for more hours but at a reduced strain. We will also give by letter names of concerns to whom you could write in regard to batteries and automatic cutout devices.

HUDSON 6-40 GENERATOR REGULATING SYSTEMS

Q—We are having some trouble trying to get the generating system on a 6-40 Hudson to charge enough. We have had the generating brushes out and they are new and in good shape. The commutator is clean and bright, but 8 amperes is all the charging current we can get. Is there any way of increasing this output? —F. W. Smith, Brooklyn, Wis.

Both in 1914 and 1916 a model 6-40 Hudson was built. In the 1914 car the regulation of the current was by means of a bucking or reverse series field in which no adjustment is possible. If this model gives trouble it is possible that there is an open in the armature which should show up by a burnt condition at two commutator segments.

If it is the 1916 car the regulation is by means of resistance spools across which a rheostat arm varies the contact. This arm is moved by means of a governor mechanism at the distributer end of the generator. In this generator six spools are available numbered 633, 703, 702, 701, 817 and 955. Number 633 is wound with the largest wire, the sizes reducing in the order named. In this generator it is necessary to put in a spool with larger wire to get greater output. If you need additional information advise us the year of the car.

VALVE TIMING PUBLICATION DATES

Q—Have you ever published a maintenance data sheet on valve timing on all American made cars and trucks?—Henry W. Menges, Louisville, Ky.

Maintenance data sheets giving valve timing of American cars were published on the following dates, in MOTOR AGE.

September 16, 1920
September 23, 1920
September 18, 1919
September 4, 1919
September 11, 1919
September 25, 1919
October 2, 1919
July 24, 1919
July 31, 1919
August 4, 1919
August 21, 1919
August 28, 1919

The next edition of valve timing maintenance data will be printed within a few months.

2—Refer me to some good auto electrical book.

2—This will be answered by letter.

Architectural Service

IN giving architectural advice, MOTOR AGE aims to assist its readers in their problems of planning, building and equipping maintenance stations, garages, dealers' establishments, shops, filling stations, and, in fact, any building necessary to automotive activity.

When making request for assistance, please see that we have all the data necessary to an intelligent handling of the job. Among other things, we need such information as follows:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated and how large it is expected to be.

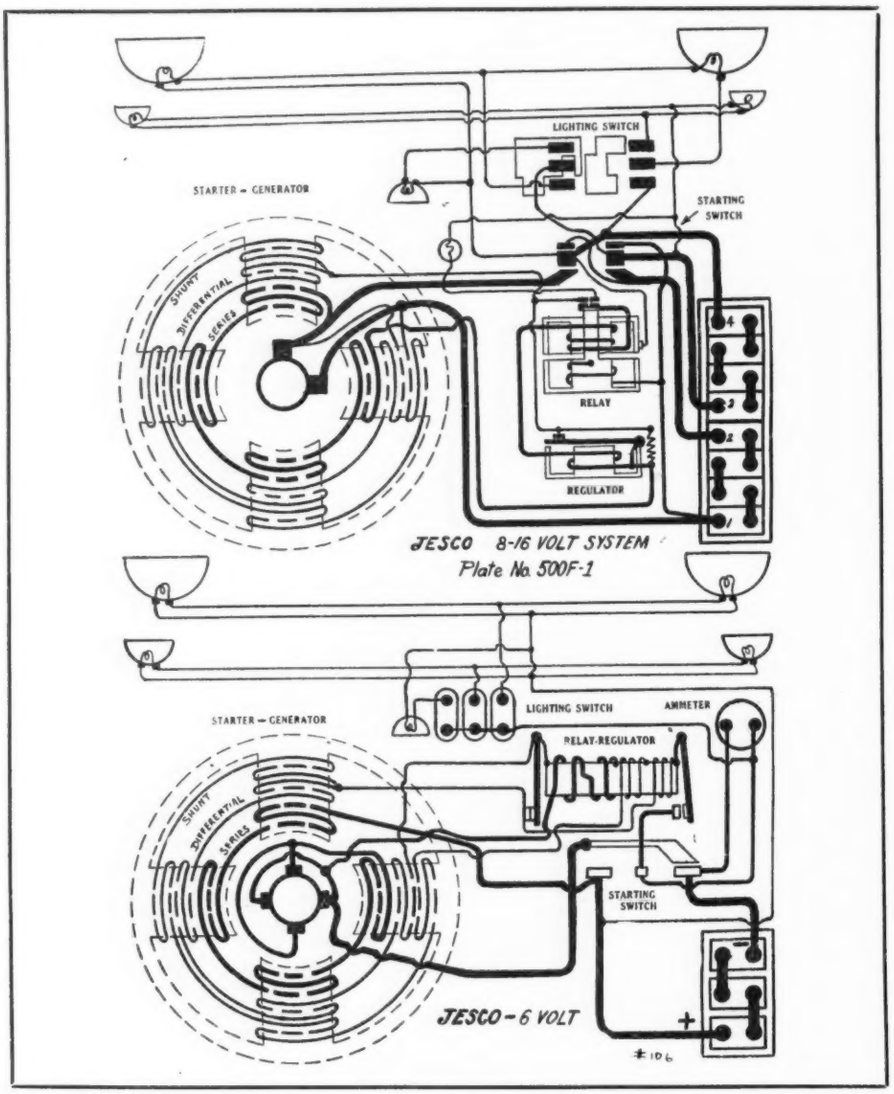
Number of cars on the sales floor.

Number of cars it is expected to garage.

Number of men employed in repair shop.

How much of an accessory department is anticipated.

Wiring of Marathon Car



Q—I was referred to you as the proper source from whom to secure a wiring diagram for model Winner Marathan car by the Auto Parts Company of Nashville, Tenn. Can you furnish this?—L. Millison, Soldiers Grove, Wis.

Diagram requested is illustrated in Fig. 106.

ADJUSTMENT OF CADILLAC CARBURETOR

Q—Give the correct method of adjusting a Cadillac carburetor type 3, No. 50689-3. This carburetor replaces the one which came in the car from the factory, model of car is 61-B.

1—The only practical adjustment on the Cadillac carburetor is the air valve tension adjustment, which is located at the right hand upper portion of the carburetor, as shown in the sketch in Fig. 107. When the lever on the outside of the carburetor is held forward against the stop on the carburetor body, the tip of the air valve should, at a room temperature of 65 to 85 degrees Fahr. have an opening 1/16 to ⅛ inch when held up lightly.

In making this test do not apply enough pressure to the valve in holding it up to the spring to spring the thermostatic member to which the rear member of the air valve is attached, and against which the valve strikes when the lever is held forward. If the opening under these conditions is more or less than the limits given a readjustment may be made after removing the cover which carried the assembly and loosening the two screws which hold the bracket carrying the thermostatic member. Tighten the screws after completing the adjustment.

The tongue on the lever which actuates the air valve should stand in the center of its slot when the carburetor enriching button on the instrument board is pushed forward as far as it goes. If the tongue does not stand in the center of its slot a readjustment should be made.

Adjustment of Auxiliary Air Valve Spring

Before attempting to adjust the auxiliary air valve spring, make certain that the enriching device is in correct adjustment, also make certain that the relief valve over the air valve seats properly. The rear end of the auxiliary air valve spring is attached to a thermostatic member which automatically adjusts this spring to compensate for changes in temperature. Auxiliary air valve spring readjustment is therefore very rarely required when once made.

The adjustment of the auxiliary air valve spring is made by the adjusting screw referred to. To determine whether the spring requires readjustment and to make a readjustment, proceed as follows: Start the engine and run it until the inlet manifold is up to normal driving temperature. Place the spark lever in the fully retarded position and move the throttle lever to the "closed" position. The engine speed should then be about 300 r.p.m. If the engine runs faster than this loosen clam screw and unscrew the throttle stop screw until the engine speed is reduced to 300 r.p.m.

If unscrewing the stop screw does not permit the throttle in the carburetor to close enough to reduce the engine speed to 300, loosen the set screw in the small collar on the end of control rod running from the steering gear to the bell crank lever at the side of the starter housing. If the engine runs less than 300 r.p.m., move the throttle lever down until the engine speed is increased to about 300 r.p.m.

Then make the following test to determine the necessity for adjusting the air valve spring: Press down gently on the ball shaped counterweight of the auxiliary air valve and note whether the immediate result is an increase or a decrease in engine speed. Release the counterweight and allow the engine to run a few seconds to regain its normal speed. Then press up gently on the counterweight and note the effect on the engine speed.

If the mixture is correct, the immediate result of gentle pressure up or down on the counterweight of the auxiliary air valve is a slight decrease in engine speed. If the immediate result of gentle upward pressure on the counterweight is a slight decrease in engine speed while the result of downward pressure is an increase in engine speed, a rich mixture is indicated. If the result of downward pressure is a decrease in engine speed while upward pressure causes an increase in engine speed, a lean mixture is indicated.

Turning the air valve screw clockwise gives a rich mixture and counter-clockwise a lean mixture. Continue to change the adjustment of the screw and to test above until the correct mixture is indicated. If this adjustment does not give satisfactory results, would advise that the carburetor be sent to an authorized Cadillac service station. The carburetor thermostats are best adjusted by someone familiar with Cadillac maintenance.

Synchronizing Breaker Points On Cadillac

2—Advise how to time the ignition or check up on same.

2—The first step will be to synchronize the breaker arms. Proceed as follows: Remove the distributor rotor. Insulate the contact arm springs from the aluminum housing by inserting pieces of heavy paper or light cardboard no thicker than a common calling card between the

(Continued on next page)

(Continued from preceding page)

springs and the housing. Disconnect the wire from the lower terminal on the end of the ignition coil on the dash and connect it to the upper terminal on the end of the coil.

Connect the 6-volt lamp to each contact arm, grounding the other terminal of each lamp. Switch on the ignition and crank the engine slowly by hand. The two lights will be extinguished at the same instant if the contact points open simultaneously. If they do not open simultaneously and the gaps between the contact points are in correct adjustment, it means that the segment plate must be adjusted.

There are three holes in the segment plate which are elongated in a direction parallel to the contact arm. This permits adjustment of the position of the contact arm relative to the cam. This adjustment is made at the factory and the plate need not be readjusted unless it has been removed or the screws have been loosened. The plate should not be removed in removing the contact points to clean them.

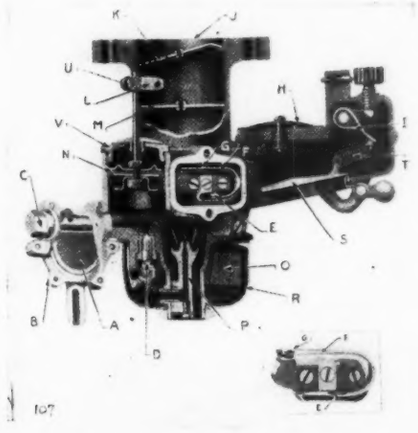
The test with the lamps will determine which set of contact points open first. If the test shows that the contact points on one side open before the other, loosen the three screws and the nut at the end of the resistance unit and move the segment plate slightly toward the resistance unit. Continue the adjustment of segment plate until the test indicates simultaneous opening with both gaps correctly and equally set.

Timing the Ignition

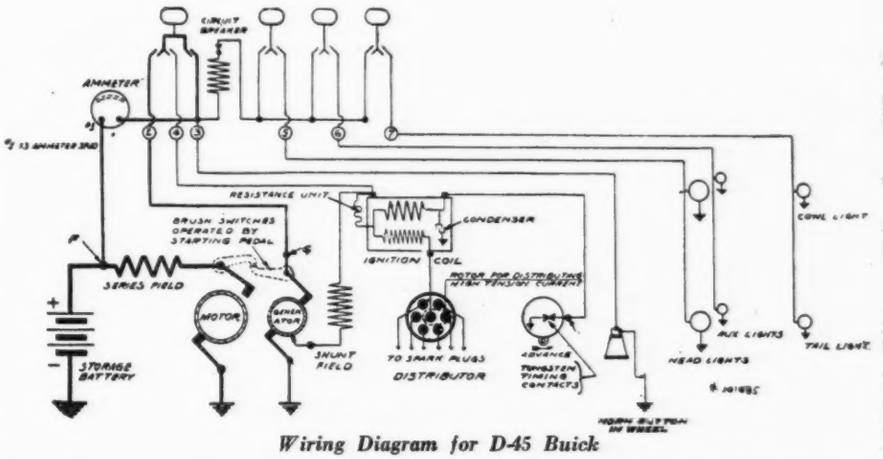
Move the spark lever to the retard position; open the compression release cocks on the cylinder blocks and crank the engine by hand until the piston in No. 1 cylinder is on firing center. No. 1 cylinder is the one nearest the radiator in the left hand block of the cylinders.

Next remove the distributor head, also the rotor, and loosen the lock screw just enough to allow the cam to be turned by hand after the rotor is fitted. Turn the cam until it is in the correct position for the terminal marked 1 one the distributor head. Move the spark lever at the steering wheel to the advanced position.

If the cam is properly set the contact points will just open when a point 1 21/32 inches in advance of the center line for each cylinder is directly under the pointer attached to the crankcase of the engine. This point for each cylinder is marked on the flywheel by the letters (IGA). The letters IGA stand for "ignition advance."



Cadillac Type 3 Carburetor



Wiring Diagram for D-45 Buick

Either of two methods may be used for indicating the instant the contact points open. We will outline the first method as follows: With the distributor head and rotor in place, switch on the ignition and hold the high tension spark plug wire about ⅛ inch away from the cylinder casting, then crank the engine slowly by hand in the direction in which it runs. Stop cranking immediately a spark occurs between the wire and the casting. If the ignition is set properly the contact points will open and spark will occur when the center line of the flywheel for each cylinder is directly under the pointer attached to the crankcase or has just slightly passed the pointer.

STARTER CRANKS ENGINE BUT CAN NOT START IT

Q—We have a 1917 model D-45 Buick 6 in which we have installed new piston rings and reground the valves. The engine is properly timed and the distributer points are clean and properly adjusted. The engine bearings are taken up and the motor is run in so that it turns freely. The engine starts with great difficulty, however, and will not start with the starter, although the starter turns the engine over very well. We have installed a new ignition coil with no benefit. If the engine is primed by removing the plugs it will start by cranking and after it is warmed up it starts with the starter. Carbureter is clean and seems properly adjusted.—G. H. Snyder, Prop., Routt County Garage, Oak Creek, Colo.

You can tell whether the trouble is due to ignition or carburetion by removing a wire from the spark plug and holding it within 1/16 inch of the upper terminal of the plug. Then have some one operate the starter as would normally be done in starting the engine. If a spark jumps at this test gap it shows that the ignition system is substantially O. K. for the spark will also have to jump at the inside gap which is under compression. If you find that the spark does not jump or will only jump a short distance when the wire is held near the engine it would then be well to check the system with a voltmeter.

We suspect that there is a poor connection in the ammeter or in the ignition switch which cuts down the amount of battery current going to the ignition coil and we also feel that when the starting motor is drawing current that the battery voltage is so much reduced that combined with the resistance or poor connection it does not give the ignition coil enough current to give a good spark.

We are showing a wiring diagram of the 1917 Buick and in this you will notice that current from positive battery comes up to a junction marked F and that ignition current then goes up to the No. 1 terminal on the ammeter, then over to the No. 3 terminal and by action of the ignition switch button to terminals 2 and 4. Terminal 2 carries current to the generator side of the armature while terminal 4 carries current to the ignition coil and to the field of the generator.

If a voltmeter is available you should disconnect the shunt field wire from the ignition coil and the No. 2 wire from the switch and then turn on the ignition switch and turn the engine over until the interrupter points close. This will allow the ammeter to read ignition current only. Then take the voltmeter and connect it from the frame of the car to the F terminal, then to the No. 1 terminal of the ammeter and then to the other side of the ammeter. Then take a reading at the No. 3 terminal of the switch and then at the No. 4 terminal then at the terminal of the ignition coil which is connected to the No. 4 terminal.

All of these readings should be about the same and if at some point you find a sudden drop in the reading it shows that there is a poor connection between that point and the previous one tested. In this way you should be able to locate a loose connection if there is one present.

While ignition trouble is most likely from the symptoms as you describe them it is a possibility that the carbureter is at fault. Would suggest your looking at the lever which operates the choker and see if the set screw is tight so that the choker thoroughly stops up the air passage. You might also test for air leaks when you get the engine running by squirting gasoline around the gaskets of the intake manifold.

Wiring of 1917 Marmon

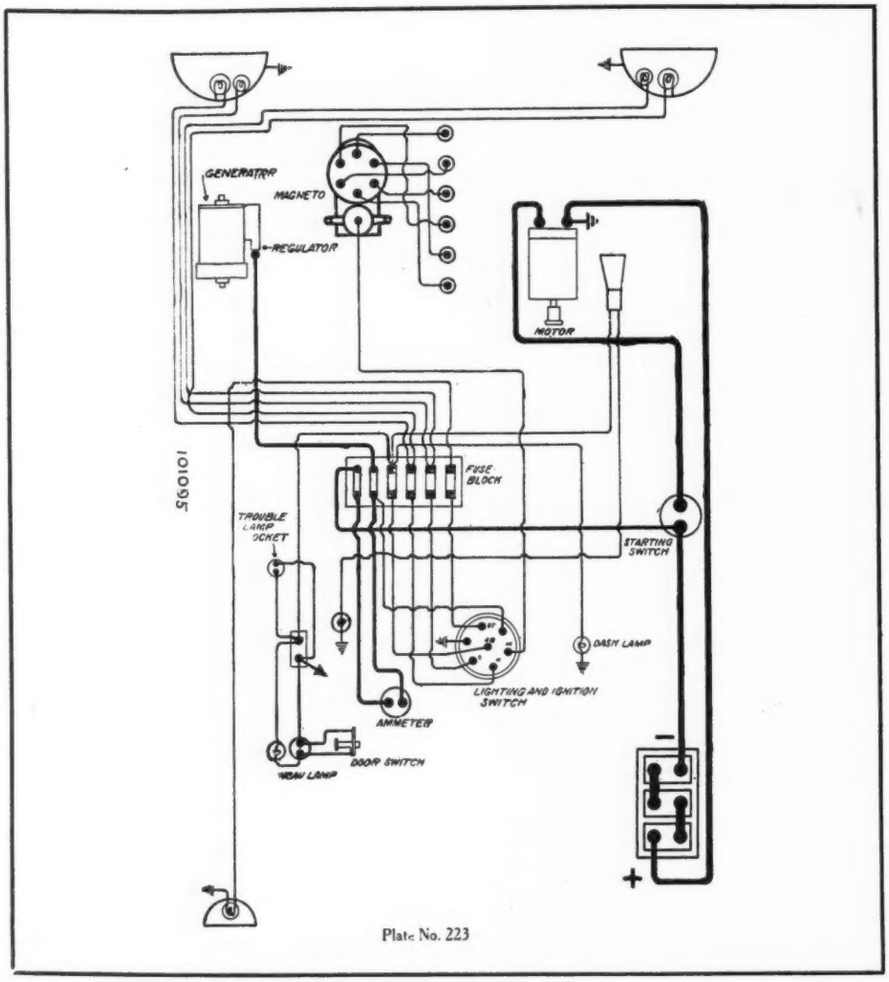


Plate No. 223

Q—Supply wiring diagram of 1917 model 34 Marmon. If this system can be changed over to a single wire system send directions for doing the work.—William W. Gilbert, Ocean Park, Calif.

1—Wiring diagram is given in accordance with your request. The two-wire feature appears to be confined to the battery and starter circuits and there would not seem to be much object in eliminating this one cable from positive battery to the starting motor, although you could do so if you wanted to. It would mean running a cable from positive battery to the frame of the car and making a good connection. The best sort of a ground connection is made when the frame is first scraped clean and then covered with a layer of solder, this being commonly known as tinning the frame. Then when the copper terminal is securely bolted to the tinned surface it makes a connection which is not readily affected by corrosion.

DOLLISON GIVES THE "LOW DOWN" ON OIL PUMPING

Q—We often come across the trouble known as oil pumping, but I do not believe that there really is any such thing. We often examine a spark plug which has not been firing and find it wet with what we call oil. No doubt, after cleaning this plug thoroughly and replacing it the engine will fire and hit regularly for some time. Then the same thing may happen again.

We then resort to drilling and beveling the ring grooves or put on some kind of patented rings, or perhaps we do both of those things. I have seen well-known makes of patented rings fail, and they were fitted properly to pistons which were properly installed in the cylinders.

My theory of this trouble is that the gasoline is incompletely vaporized and condenses on the walls of the cylinders and on the spark plugs. I also believe that oil which works up past the pistons becomes mixed with this gasoline vapor and is carried by it to the spark plugs, where it either insulates the points or shorts the insulation.

We often find this trouble in the two front cylinders more than in the others. I think this is due to the cold air coming through the radiator and striking the part of the manifold which carries the fuel to the front cylinders. I also think that a long manifold gives more of this trouble than a short one. I feel that the remedy lies in heating the fuel with a hotspot or by some other means and that in this way what we call oil pumping can be overcome.—John A. Dollison, Quaker City, Ohio.

A—We feel that there is a great deal of truth in Mr. Dollison's analysis of what is commonly known as oil pumping, although, of course, it is essential to have pistons and rings which fit the cylinders properly. It is true, however, that piston rings which are a loose fit in the slot will work up and down to a certain extent and cause oil to pass around in behind the rings and work up into the cylinder. With loose rings this occurs more rapidly than with rings which are a good fit in the slot.

In addition to poor carburetion, there is also the possibility of a weak spark preventing a cylinder from firing. Whenever a cylinder fails to fire for two or three times it allows two or three times as much oil to work up as would ordinarily be the case. This means that the plugs may become shorted or fouled up so that the engine will continue to miss on that cylinder.

If we could entirely prevent oil working up past the pistons, we would have pistons which would stick in the cylinders for they would have no lubrication. It is, accordingly, necessary to have some oil work up past the pistons, and if but a small amount works up and is of a suitable grade, it will burn when the charge in the cylinder fires.

WRONG STYLE RECTIFIER FOR 25 CYCLE CURRENT MAY MAKE FOR POOR EFFICIENCY

Q—We have just recently installed a Tungar rectifier for charging storage batteries. We have 25 cycle current and are not very well pleased with operating results. (Later on it is stated that this is not a genuine Tungar rectifier made by the General Electric Company. The name Tungar is copyrighted and used exclusively by the General Electric Co.)

We would therefore appreciate a reply advising the amount of current consumption that a device of this kind should have when charging four batteries at 5 amperes. We connected up four batteries for 7 hours and the rectifier consumed 4 kilowatts, which we think is too much while only charging 5 amperes. This is one of Walter Rowan's rectifiers using a Tungar bulb.—Jackson Highway Garage, Mulberry, Ind.

You will note from the above statement in parenthesis that the term Tungar can properly be applied only to those rectifiers made by the General Electric Company. There are two possibilities, one is that the rectifier has not the proper efficiency, and the other is that it is designed for 60 cycle operation and you are using it on 25 cycle current.

With four batteries on charge and assuming a voltage of 8, which includes the battery voltage and resistance of leads, we have a total of 32 volts, which multiplied by 5 amperes gives 160 watts. Multiplying the watts by the number of hours, we have 160 times 7, which equals 1120 watt hours or 1.12 K.W.H. (Kilowatt hours.) To find the efficiency, we divide the kilowatt hours you obtained by the kilowatt hours you paid for, or 1.12 divided by 4, which gives us 28 as the per cent efficiency.

Comparing this with 4 batteries connected on a 4-battery Tungar, we find that it is supposed to use 283 A. C. watts, and dividing 160 by 283 we get an efficiency of 56.5, which is claimed for a 4-battery Tungar. The efficiency claimed for the 10-battery Tungar, operating under similar conditions, is 60 per cent, so that the device you were using was approximately one-half as efficient as it should have been.

Timing Chain Adjustment on 1923 Willys-Knight

Q—Give proper method of adjusting Willys-Knight drive chain, 1923 model.

1—Adjustment of the Willys-Knight front end chain is accomplished without removing the chain case. The procedure is as follows: Disconnect generator at the generator drive coupling and remove. When generator is thus removed it will expose four cap screws covering the plate over the eccentric bushing. Movement of this eccentric bushing varies the center to center distances of the sprockets and, of course, either loosens or tightens the chain tension. There are no serrations or facilities for using a wrench on this bushing and it is necessary to use a drift to move it.

Correcting Oil Gage Trouble

2—What would cause the oil gauge to show empty while car was running with 3 or 4 gallons medium oil in crankcase? As soon as motor was stopped gauge would raise clear to top. We removed pan and found float leaking and soldered it and sawed notches in bottom of the tube that float travels in, thinking tube came to near bottom of pan, thereby restricting flow of oil, but same condition exists. A leaky float would not cause it because it floats when engine is dead.

2—The tube in which the float travels is about 1/16 inch larger in diameter on the inside than the outside diameter of the float. Using the heavy oil recommended by the Willys Company, the float, when the oil is in a congealed condition, acts as a piston, and as the inlet side of the oil pump is connected to the bottom of the tube, the suction created by the pump draws the float down, thus registering empty.

The remedy for this trouble is to remove the tube, and with a hack saw slot one side for a distance of about 4 inches from the bottom upward. Do not slot through both walls of the pipe, as one side only is necessary. The slot is used to admit air so as to relieve the vacuum created by the suction of the oil pump.

3—Give diagram and list of material necessary to construct a good growler to operate on 110 A. C.

3—Description of a growler of this type was printed in the April 12, 1923, issue of MOTOR AGE on page 23. As your subscription dates back to June, we are enclosing a clipping of the article in question with letter.

Legal Aspects of Maintenance in Indiana

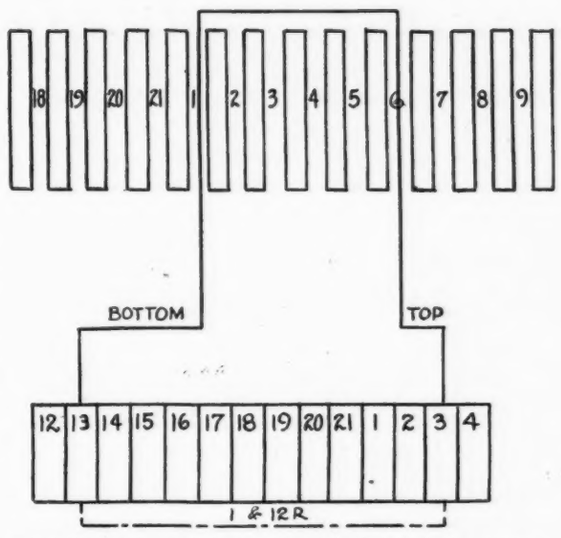
4—What are the laws and price of 1924 dealers' license in Indiana? Is it permissible to use same on service cars and trucks or privately owned cars of company officials or company owned cars driven by company officials?

4—We regret to state that the Legal Department has as yet received nothing on the Indiana 1924 law. Would suggest that you write the Secretary of State at Indianapolis.

Tires

5—Where can I obtain a good book on tire vulcanizing?

5—This will be supplied you by letter.


18 19 20 21 1 2 3 4 5 6 7 8 9
BOTTOM
TOP
12 13 14 15 16 17 18 19 20 21 1 2 3 4
1 & 12 R
GENERATOR
MAKE FORD
TYPE. 1920 MODEL.
SLOTS. 21
SEGMENTS 21
COIL PITCH 1 & 6.
COIL PER SLOT. 1.
TURNS PER COIL 9.
WIRE SIZE 16.
WIRE INSUL D.C.C.
COMM. CONN. 1 & 12 R.
TOP LEAD. 3 R. OF NO. 6 S.
BOTT LEAD. 10 L. OF NO. 6 S
POLES 4
VOLTS 6
WINDING 1.2.3. ETC
REMARKS. NO. 1 SLOT IS THE BOTTOM OF COIL NO 1 SEG AT THE TOP OF COIL.

FORD GENERATOR ARM WINDING DIAGRAM *100499

Flat Rate

6—Where can I obtain a good flat rate on Fords?

6—The Ford Motor Company supply flat rate to their dealers and schedules which are practically duplicates of the Ford are furnished by the Sales Equipment Company, Detroit, Mich., publishers of **Fordex.**

7—Explain the principle upon which the dash type gasoline gauge works on a 1923 Nash sedan, and cause of failure. Gauge shows 9 gallons at all times.

7—Gauge used on the 1923 Nash models incorporate a float of conventional style, to which is fastened a flexible wire housed by a metal tubing of larger diameter. This tubing, with the wire enclosed, is brought up to a dial installed on the instrument board. Failure of the gauge to work lies either in the float being water logged or leaky or to a bend in the housing over the wire. In other words, friction some place in the housing causing the wire to bend.

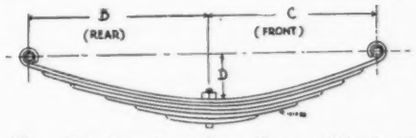
8—Give diagram of Ford armature winding.—Railroaders' Garage, Co., Corydon, Ind.

8—Diagram requested is shown at Fig. 100499.

SPRING DIMENSIONS ON WILLYS-KNIGHT

Q—Advise what size springs are used front and rear on Willys-Knight model 20,1920, also on model 64,1923. Do they use the same spring?

1—From our records and from other information available from replacement spring makers we conclude that the springs were the same for 1920, 21, 22 and 23. In the illustration various dimensions of the spring are shown as B, C and D.



For the front spring the width is 2 inches, six leaves being used. B is 19 inches, while C is 17 inches and D is 2¼ inches. Both spring eyes are bushed and a ⅝ inch bolt is needed.

On the rear spring seven leaves are used and it is 2¼ inches wide, B is 28¾ inches, while C is 25¼ inches and D is 7½ inches. Both spring eyes are bushed and the front bolt is ⅝ inches in diameter, while the rear bolt is ¾ inches in diameter.

Compound Wanted for Softening Water

2—Can you tell us the name of some substance we can use to soften water? We have an open tank holding 10 barrels. Freeland Sons Company, Sturgis, Mich.

2—We will give you by letter the name of the concern making a compound which not only softens water but also serves as a good cleaning compound for greasy parts.

A CASE WHERE A KNOCKER MAY DO SOME GOOD

Q—We are having trouble with a 1923 Overland touring which vibrates when running at between 25 and 34 m.p.h., so that it is very uncomfortable. We have tried padding the gas tank but it does no good. The motor is O. K. and has no vibration under 25 m.p.h. Would you recommend the interlocking crankshaft balances or would a careful balancing of the present rods, pistons, flywheel and shaft be all that is necessary? Would light weight pistons and rods help the condition? The car has only been used for 3,100 miles.—F. O. Wood, Elkhart, Ind.

There is not much question but what the source of the vibration is in the power plant. However, the entire elimination of vibration is a difficult matter and we would suggest that you make the following test. Drive the car at about 30 m.p.h. and while doing so have some one put his fingers under the bottom of the gas tank which is located under the cowl. If this stops the noise of the vibration it shows that it is the bottom of the tank which is causing the sound.

If this is the cause you can correct it by taking a mallet and knocking a few dents in the bottom of the tank or else by using a jack on the floor and forcing a few dents in the tank which will have the effect of stiffening it. Light weight pistons and rods will of course tend to eliminate the source of vibration.

SQUEEKS & RATTLES

AND now, the Chicago show threatens. Gas saving device manufacturers will continue their relentless campaign against the truth.

No one will solve the used car problem.

Sam Miles will not declare the show the greatest ever held.

The Coliseum restaurant will serve good food.

Bell boys won't know where to get it.

Yes, the Chicago show threatens.

Headlines

"Another Earthquake in Japan"—They just got the used cars there in time.

Sock

Jobber Salesman: "You'll have to admit that I have a good line."

Dealer: "Yes, but it isn't convincing."

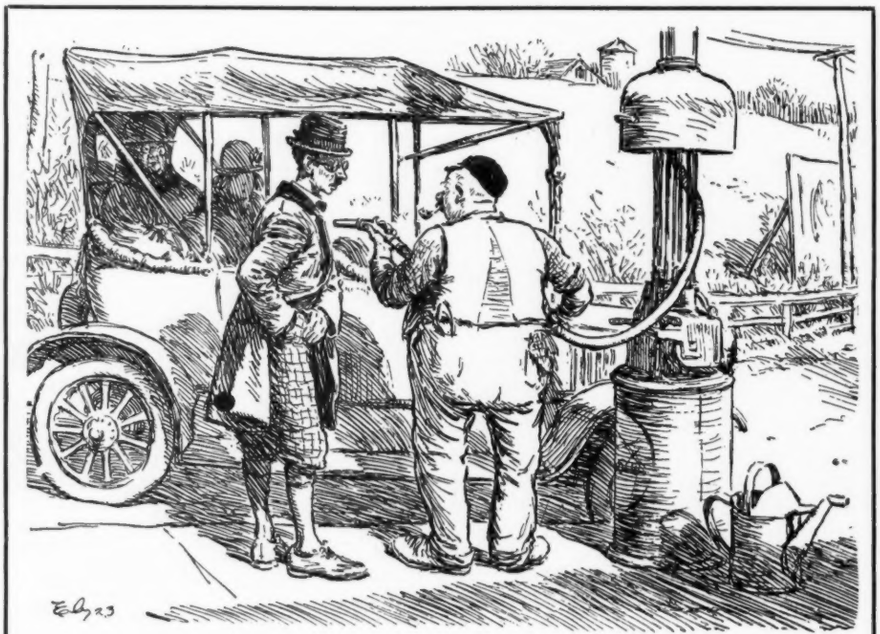
ROADS are arteries of trade. These arteries are rapidly being hardened by bootleggers.

ROADS are always in two conditions. Either closed for repairs or open to improvements.

ROADS are the shortest distance between two detours.

ALTHOUGH the oldest boulevard in history is Appian Way, built by one of those Caesars from Rome to Appia, our roads will soon catch up to it if they continue to age as rapidly next year as they did last.

THERE are also signposts to tell you just how far you are from where you thought you were.



Ely in *Life*

Garageman: How much do you want? *Driver:* A gallon. *Garageman:* Wot's the idea—weanin' it?

Humorous Note

Guy writes in and wants book or books on the ethics of the automobile business.

Not Too Early

Bystander: "I observe that you treat that gentleman very respectfully."

Garageman: "Yes, he's one of our early settlers."

Bystander: "Early settler? Why, he's not more than forty years of age."

Garageman: "That may be true but he pays his bills on the first of every month."

Friends Don't Mean a Thing

"Don't you lose friends by running your business on a strictly cash basis?" asked the friend.

"Yes," replied the dealer, "but not money."

Correct

No psychoanalyst is needed to interpret day dreams. A day dream means that the dreamer has been stalling on the job.

Olaf says, "Breaking into print is like breaking out with smallpox—you've got to get the permission of the health department to do it."

We have solved the problem
Of why it is
That in great emergencies
The call goes out
All hands on deck
The answer is
To keep anyone
From stacking
The deck.—HAP.

Prize Contest Announcement

CYLINDER, Ia., Jan. 23.—The Association of Gas Saving Device Manufacturers announce a prize contest in which $100 will be awarded to the person who can think of the biggest number that will conveniently fit into an ordinary newspaper page ad and which will suitably express the number of miles the motorist saves on a gallon of gas with one of the members' gadgets.

SPEEDWAYS are built to enable students in high-tempered cars to drive one hundred miles per hour with one arm around their best girls and the other arm waving at some acquaintance. In this way they manage to get fifteen miles of skids out of every gallon.

WHEN coming to railroad crossing always blow your horn at engineer and make him respect you. If safety gates are down drive through them and show your authority. We must teach freight trains to know their place.

NEVER slow up going past schools. Teach 'em to dodge early and train 'em.

Edison Just Looked Up Some Old Patents

Valvy.—"Who was the first electrician, anyway?"

The Red Head.—"You're a bum Bible student. It was Noah—he made the arc light on Mount Ararat.

Like the Movie With Two Doors Marked "Exit"

Not far off the boulevard between Los Angeles and San Diego are some quaint towns and one of them has a unique garage. At one time it was a church, but now a double door has been cut through the side and the vestibule at the front is used for an office. But the blend of old and new affords a laugh to every traveler who stops there, for over the door, weatherbeaten but still readable, is a scriptural quotation that goes: "Behold, I have set before you an open door." And on the panel below, the garage man has inscribed in red paint, "Positively no admittance."

"Bugs" Baer addressed the motor roadeo, just before the opening of the New York show. Excerpts from his speech are neatly arranged around the picture which adorns the center of the page. In these few items, "Bugs" has summed up the situation as is.

LEW BRICATION

Handles Wire and Disc Wheels as Easily as Split Rims!

IF YOU'VE ever wrestled an hour or two with a tire "frozen" to a wire or disc wheel or solid rim---trying to pry it off with the means available in the average shop---you'll appreciate at a glance how much time and labor this new Weaver Universal Tire Changer, Model "E," will save in your shop.

It's the only Tire Changer on the market that will handle all types and sizes of pneumatic tires (including the new "balloons" up to 7½ inches) and rims.

Mounted on your curb, you'll find it a splendid advertisement of your quicker and better service---an effective means of attracting to your shop the growing number of car owners who are unwilling to intrust their work to sledge hammer methods.

If you handle any tire repairing, you'll be interested in reading our circular completely describing this new equipment. Write for it today.

WEAVER MFG. CO., Springfield, Illinois, U. S. A.

Weaver Canadian Co., Ltd., Chatham, Ontario

The new WEAVER UNIVERSAL Tire Changer Model "E"

The best equipped shop gets the business

Motorex, Useful Book for Automobile Salesmen

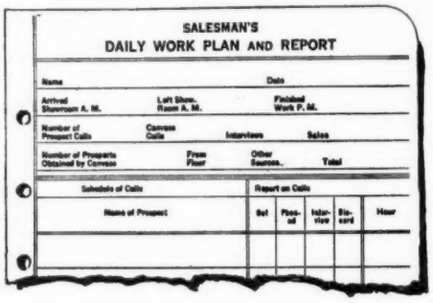
Covers Field of Automobile Selling Including Specifications, Models, Prices, Used Cars, Deferred Payments, Service and Similar Subjects. Spaces Provided for Salesmen to Fill In

MOTOREX is a book for automobile salesmen. It contains sales data in loose leaf form and is so arranged and indexed that desired information can be readily found. The binding is black imitation leather and a standard ring device holds the sheets. The book may be carried in the pocket.

Divided into 10 sections, this book covers the field of automobile selling rather completely, including such subjects as car specifications, models, prices, accessories, used cars, deferred payments and service. Many sections comprise chiefly blank forms which are to be filled out by the salesman in accordance with the make of car he is handling and prices and terms applying in his own community. Other completely printed sections give a vast amount of standard information about the automobile industry, all of which should be of value to men engaged in the sale of new or used cars.

One of the tables gives the prices of all Ford models since 1903. Another gives current passenger car prices and weights. In the used car section is a table showing the serial numbers of some of the leading makes of cars in chronological order, providing a ready reference by which the approximate date of manufacture of a particular car may be determined.

Many of the sections need to be filled out by the salesman in order to be of value to him. For instance, the deferred payment section provides blanks in which may be listed all information about time payment prices of the various models of the line the salesman represents. Details are given for time payment plans where the down payment is 25 per cent, 33 1-3 per cent, 40 per cent and 50 per cent. Space is provided for the salesman to fill in the total time payment price and the amount of each payment when 6, 8, 10 or 12 payments are provided.


SALESMAN'S
DAILY WORK PLAN AND REPORT

Name Date

Arrived Showroom A. M. Left Show. Room A. M. Finished Work P. M.

Number of Prospect Calls Canvass Calls Interviews Sales

Number of Prospects Obtained by Canvass From Floor Other Sources Total

Schedule of Calls | Report on Calls

Name of Prospect | Out | Phoned | Interview | Standard | Hour

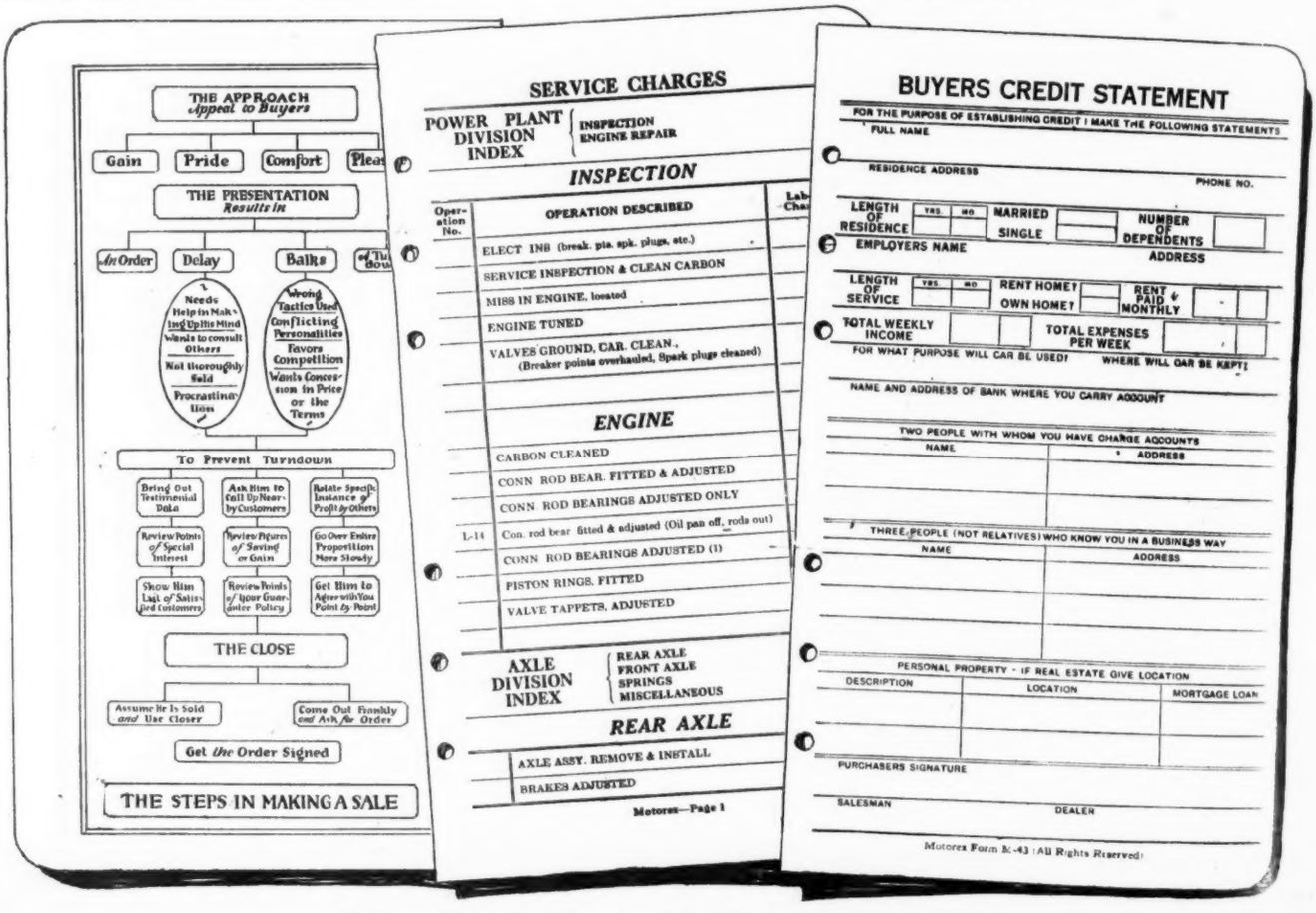
Other blanks provide for the listing of complete information about insurance charges. There are also lists of accessories with space for recording the list price and the price installed. In the accessory section is a page of suggested monogram designs.

The book contains blank forms for checks, trade acceptances and receipts. It also contains order blanks for passenger cars, trucks and accessories.

The service section contains much general information and provides blanks upon which detailed service charges for the particular cars handled may be listed.

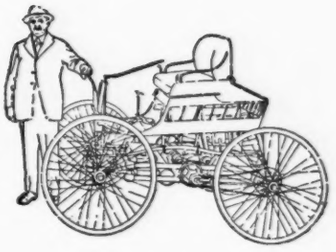
A section devoted to records contains blanks for the salesman's daily plan and report, a list of his new prospects as received, a record of his sales, and memorandum spaces for his appointments and addresses for future reference.

Motorex is published by the Sales Equipment Co., 5981 Woodward Ave., Detroit, Mich.


THE APPROACH
Appeal to Buyers
Gain
Pride
Comfort
THE PRESENTATION
Results in
In Order
Delay
Balks
Needs Help in Making Up His Mind
Wants to consult Others
Not thoroughly Sold
Procrastination
Wrong Tactics Used
Conflicting Personalities
Favors Competition
Wants Concession in Price or the Terms
To Prevent Turndown
Bring Out Testimonial Data
Ask Him to Call Up Nearby Customers
Relate Specific Instance of Profit by Others
Review Points of Special Interest
Review Figures of Saving or Gain
Go Over Entire Proposition More Slowly
Show Him List of Satisfied Customers
Review Points in Your Guarantee Policy
Get Him to Agree with You Point by Point
THE CLOSE
Assume He Is Sold and Use Closer
Come Out Frankly and Ask for Order
Get the Order Signed
THE STEPS IN MAKING A SALE
SERVICE CHARGES
POWER PLANT DIVISION INDEX
INSPECTION
ENGINE REPAIR
INSPECTION
Operation No.
OPERATION DESCRIBED
ELECT INS (break. pts. spk. plugs, etc.)
SERVICE INSPECTION & CLEAN CARBON
MISS IN ENGINE, located
ENGINE TUNED
VALVES GROUND, CAR. CLEAN, (Breaker points overhauled, Spark plugs cleaned)
ENGINE
CARBON CLEANED
CONN. ROD BEAR. FITTED & ADJUSTED
CONN. ROD BEARINGS ADJUSTED ONLY
L-14 Con. rod bear. fitted & adjusted (Oil pan off, rods out)
CONN. ROD BEARINGS ADJUSTED (1)
PISTON RINGS, FITTED
VALVE TAPPETS, ADJUSTED
AXLE DIVISION INDEX
REAR AXLE
FRONT AXLE
SPRINGS
MISCELLANEOUS
REAR AXLE
AXLE ASSY. REMOVE & INSTALL
BRAKES ADJUSTED
Motorex—Page 1
BUYERS CREDIT STATEMENT
FOR THE PURPOSE OF ESTABLISHING CREDIT I MAKE THE FOLLOWING STATEMENTS
FULL NAME
RESIDENCE ADDRESS
PHONE NO.
LENGTH OF RESIDENCE YRS. MO. MARRIED SINGLE NUMBER OF DEPENDENTS
EMPLOYERS NAME ADDRESS
LENGTH OF SERVICE YRS. MO. RENT HOME? OWN HOME? RENT & PAID MONTHLY
TOTAL WEEKLY INCOME TOTAL EXPENSES PER WEEK
FOR WHAT PURPOSE WILL CAR BE USED? WHERE WILL CAR BE KEPT?
NAME AND ADDRESS OF BANK WHERE YOU CARRY ACCOUNT
TWO PEOPLE WITH WHOM YOU HAVE CHARGE ACCOUNTS
NAME ADDRESS
THREE PEOPLE (NOT RELATIVES) WHO KNOW YOU IN A BUSINESS WAY
NAME ADDRESS
PERSONAL PROPERTY - IF REAL ESTATE GIVE LOCATION
DESCRIPTION LOCATION MORTGAGE LOAN
PURCHASERS SIGNATURE
SALESMAN DEALER
Motorex Form M-43 (All Rights Reserved)

Specimen sheets from Motorex. Copyright by Sales Equipment Co.

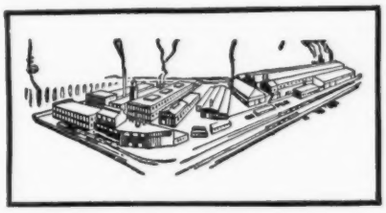
70 Years Ago



Sketch from photograph of Haynes automobile built in 1893, claimed to be one of the first motor cars in America. Curtis at that time had already had a successful career of 39 years.

39 Years Before the First Motor Car

In 1854, seven years prior to the beginning of the Civil War, starting in humble quarters, the Curtis organization was founded. Today, 70 years later, the huge Curtis organization is a true reflection of experience, solid progress and success, which can come only of many satisfied customers well served.



When the Curtis organization was established, there were no electric lights, no automobiles, no telephones, no movies. Compare those days with today. That Curtis has kept pace with the growth of St. Louis is attested by its present plant, spreading over 17½ acres of ground—its wares going to all countries of the world.

CURTIS—

St. Louis—Established 1854

It is with just pride that we announce in 1924, the 70th Anniversary of the Curtis Organization and we take this occasion to pledge a continued service and friendship to those who have made this event possible.

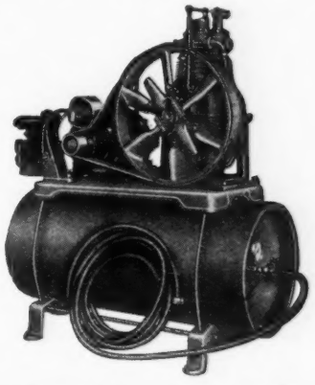
Its Significance to You

Standing squarely behind every Curtis product is our 70 years of successful manufacturing experience, the last 27 of which have been devoted to the design and manufacture of air compressors and compressed air equipment.

Curtis Compressors are manufactured from the raw product in our modern plant covering 17½ acres. This fact, together with our record of nearly three-quarters of a century in business and a future assured by a definite reputation to live up to, with ample capital and resources to do it, is your assurance that your Curtis Compressor is not likely to become an "orphan."

The Curtis organization in its 70 years' existence has endured 3 wars, several panics, storms as well as fair weather, and today stands as a monument to an ideal—that of always striving to make every step a step forward, and every customer a permanent and satisfied one.

Style "V" Two-stage Outfit
Sizes 3/4 to 2 H. P. Automatic Starter



No Spitting of Oil When a Curtis Cuts Out

There are two reasons for this. First: the exclusive and patented controlled splash oiling system prevents an excess of oil from getting into the discharge line. Second: there is no bleeding discharge pipe or intermediate tank. Automatic starting and stopping device governed by means of a centrifugal unloader.

CURTIS PNEUMATIC MACHINERY CO.
1527 Kienlen Ave. · · · · St. Louis, U. S. A.
Branch Office
530-H Hudson Terminal, New York City

CURTIS

1854 70th ANNIVERSARY 1924

CURTIS
PNEUMATIC
MACHINERY CO.
1527 Kienlen Ave.
ST. LOUIS, MO.

Gentlemen:—Please send me full details on Curtis Air Compressors, your proposition and prices.

Name_____

Address_____

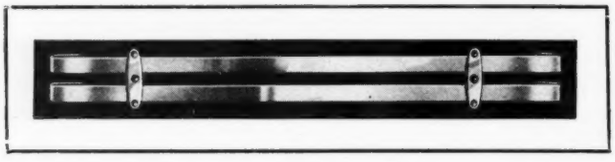
Jobber's Name_____

Address_____

Bellevue Tailor Made Bumpers

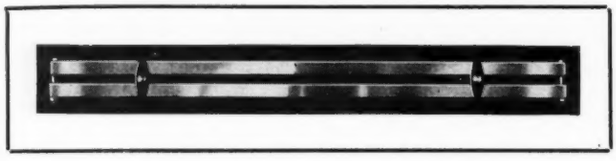
A Complete Line of Oil Tempered, Nickel Plated Bumpers For Cars of Any Weight

Separate Set of Special Attaching Arms for All Leading Makes of Cars



OHIO—3-8x2" Steel Nickel Plated . . . List $19.00
SPECIAL—5-16x1 3-4" Steel Nickel Plated List $16.50

TWO-BAR—3-8x2" Steel Nickel Plated . . List $19.00
JUNIOR—5-16x1 3-4" Steel Nickel Plated List $16.50



WINNER—1-4x1 1-2" Steel Nickel Plated . List $13.00

Winner and Beauty—the popular priced Ford, Chevrolet, Gray and Star Bumpers

BEAUTY—5-16x1 3-4" Steel Nickel Plated List $11.00

WE INVITE COMPARISON IN BOTH QUALITY AND PRICE

The Bellevue Manufacturing Co., Bellevue, Ohio

At the Congress Hotel Chicago Show Week

New York, and its great multitude of critical visitors, put the stamp of enthusiastic approval on the new Rollin during the New York Automobile Show.

We believe more Rollin contracts have been signed with responsible car merchants than has ever before been closed in so short a time.

Much of the remaining available territory will be closed during the Chicago Automobile Show. Distributors and dealers are invited to meet us at our principal Chicago exhibit, Congress Hotel—Elizabethan Room, where we will have our headquarters from January 26 to February 2.

Please bear in mind that the Rollin is the only car in America that has European type motor—4-wheel brakes—and balloon tires.

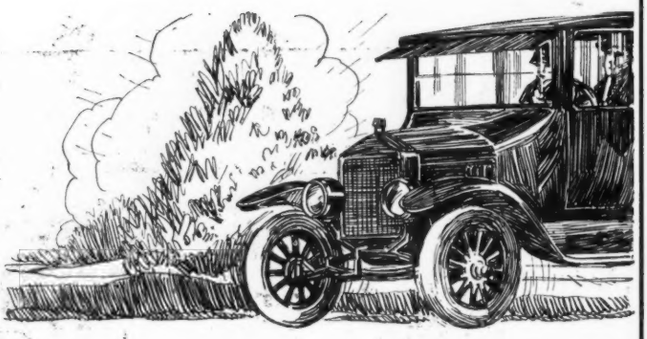
And these are but a few of the many conspicuous selling features.

THE ROLLIN MOTORS COMPANY, CLEVELAND, OHIO

Touring Car De Luxe.. $975*
Coupe Roadster..... 1175
Five Passenger Sedan.. 1275
Prices f. o. b. factory

ROLLIN

*This same model with wood wheels, cord tires and 4-wheel brakes but without De Luxe equipment.....$895



Replacements That Are Refinements

When a Ford owner buys a lamp for replacement, sell him on the idea of replacing it once and for all. It will give him the satisfaction of knowing that that item is a permanent fixture for the life of the car, and he will entertain other replacements in the same light.

For example, our No. 325 "STANFORD" is a duplicate of the standard Ford headlamp but is built by VICTOR craftsmen, to the rigid standard of VICTOR quality.

The No. 740-F drum type headlamp is a popular item. It is of the latest design, and looks especially well on the new model Fords. We furnish them in both nickel and black and nickel and with tulite bulbs and prismatic lenses, ready for immediate installation without any change in wiring.

These lamps, consistent with other VICTOR Products, have a rapid turnover — turnover that means profit to you.

THE CINCINNATI VICTOR CO.
714 Reading Road, Cincinnati, O.

Other VICTOR items for Ford cars are:
No. 811-A battery box for underslung batteries.
No. 49-J standard Ford tail lamp.
No. 325-D Standard Ford headlamp door.
No. 325-R Standard Ford reflector.

Send for a Catalog of The VICTOR Line

Victor
TRADE MARK

No. 740-F
DRUM TYPE
HEADLAMP
FOR FORDS

No. 325
"STANFORD"

The No. 56 headlamp door gives the standard lamp a new and attractive appearance. Finished in nickel with a black inlaid bead. We can also supply the No. 57 door, which is a nickel plated round door for Ford headlamps.

The No. 345 is a drum side lamp which matches the drum headlamps, and looks particularly well on the Ford closed jobs. The No. 345 will fit all 1924 model Ford cars and the No. 346 which has a different mounting will fit all models prior to 1924.

The No. 625 tool box fits between the beads on the running board and is extra long to take the standard Ford tire pump. This box is equipped with a Yale lock.

BADGER TIRES

Popular Favorites

The Right Answer to the Tire Question?

BADGER

If you want a top-notch standard quality line, competent for all kinds of service, priced to meet any competition, and unusually profitable, then investigate the BADGER line.

Made by an old-established Company, and unequalled for quality and service, it is the choice of many leading Jobbers throughout the country.

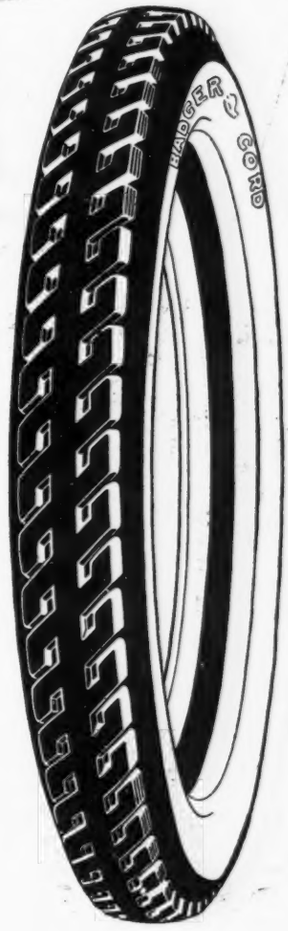
Users who once try BADGER become enthusiastic, bring repeat business and build up a permanent, profitable volume for the Dealer trade.

Whether for Passenger or Commercial Car, Bus or Stage service, there is a BADGER in proper type and size to meet any requirement.

IT IS THE RIGHT ANSWER TO THE TIRE QUESTION.

Factory distribution through accredited Jobbers only. If your Jobber does not carry BADGER, write for full particulars to:

THE BADGER RUBBER WORKS
Milwaukee, Wisconsin



BADGER CORD

"REAL QUALITY"

sells on appearance—repeats on operating record.

Buffalo Visors are handsome—the bright aluminum braces and brackets contrasting snappily with the black eggshell-gloss enamel top or restful green underside.

A "Buffalo" Visor

enhances the value of any car through both looks and service.

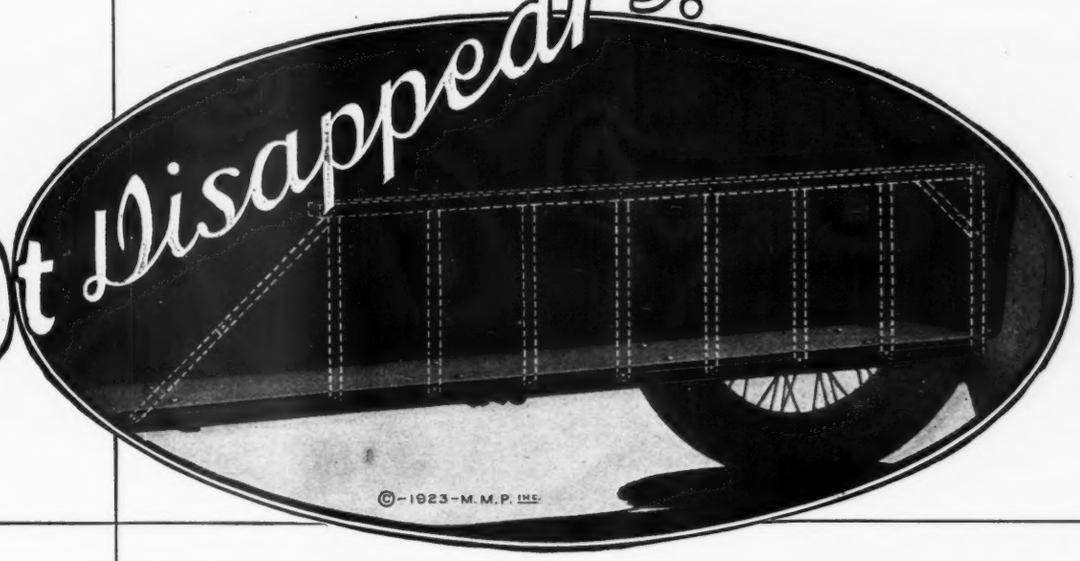
Substantial, one-piece rust resisting steel construction and bracing prevents rattle, warping, or breaking. Brackets once adjusted stay tight. Rain gutter functions well.

Buffalo Visors require no servicing to eat up your profits. We proved this on rough service tests lasting several years—thousands of owners verified results.

All the gamble has been taken out for you. Both periodical and direct mail advertising as well as our store display material will help you make record sales. Better wire for details right now to Dept. 12-C.

Buffalo Forge Company
Buffalo, N.Y.

It Disappears!



Show How It Carries

Grips, Baggage, Sample-Cases, Bundles, Sport Equipment, Game, Touring Outfit, etc.

YOU can sell dozens of GRIP RACKs — the luggage holder that *disappears!*

This good-looking, handy convenience equips any car for luggage carrying. Every motorist will quickly see the year-'round use for it—in summer for touring, picnicking and sport trips; all the time for business, shopping and suburban use.

The GRIP RACK replaces the old-fashioned, rattling, detachable "luggage carrier". It is a permanent addition to the car—bolts solidly to running-board, and re-inforces it. Folds neatly and inconspicuously — out of the way when not needed. Snaps open instantly into a firm, roomy carry-all. Never loose or lost; cannot rattle, break or rust.

You can sell the GRIP RACK — and it's worth selling. There's a size for every make of car. Retails at $5, $6 and $7, according to length.

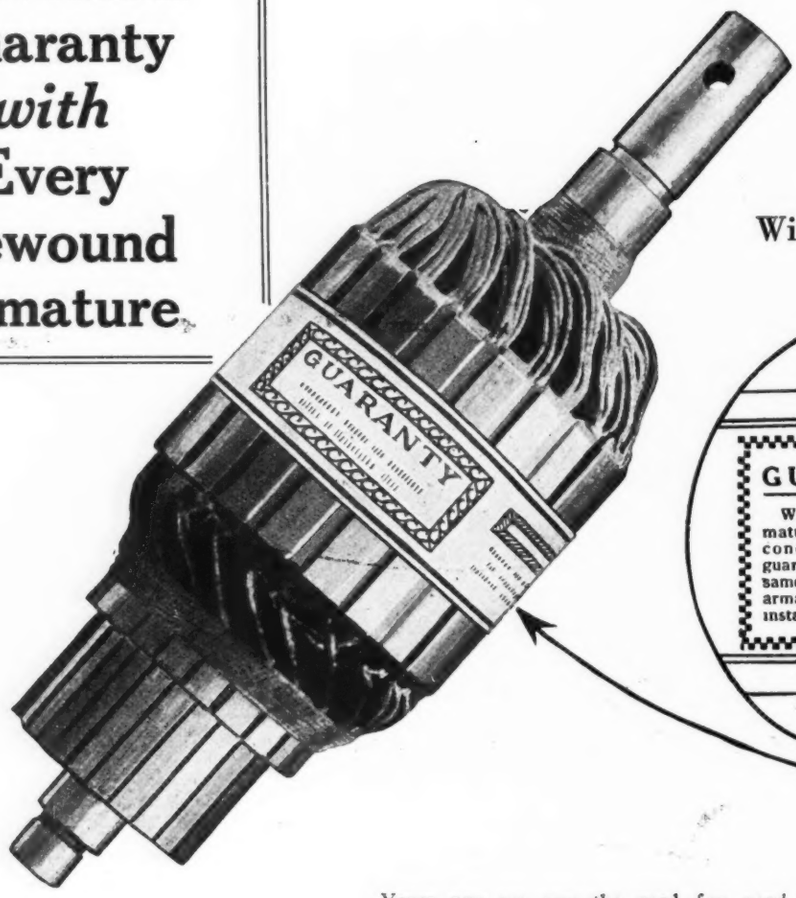
Order from your jobber. Write us for descriptive literature.

MILWAUKEE MOTOR PRODUCTS, INC.
MILWAUKEE WISCONSIN

(*Manufacturers of Fine Automotive Products for Over 18 Years*)

MILWAUKEE
GRIP RACK
MADE BY THE MANUFACTURERS OF THE MILWAUKEE TIMER

A Written Guaranty *with* Every Rewound Armature



Look For The Yellow Band With the Printed Guaranty

GUARANTY
We guarantee this armature to be in perfect condition and further guarantee it to give the same service as a new armature when properly installed.

Years ago we saw the need for *good* armature service. At that time the business was handled in a haphazard manner and was local in nature. We realized that nationalized service was needed so every section of the country could take advantage of a dependable, high grade armature rewinding service.

Our efforts have been highly successful. Our service extends to every state in the union. The field in which we were the pioneers has grown to such an extent that it is now regarded as an established, recognized part of automotive service. We have succeeded in putting armature service on a sound, business-like basis.

Today we are as careful of our work and our methods as we were in the beginning. The quality of every job we turn out is the very finest. On every armature we place a yellow band on which is printed a definite guaranty.

Now is the time to replace the defective armature you have on hand with rewound ones. We maintain a stock of over 6,000 rewound armatures for exchange purposes. All orders are shipped from this stock the same day received. Of if you prefer we will rewind the exact cores you send to us and return them to you.

Your order will receive immediate attention.

PRICES

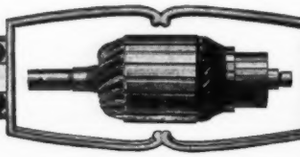
FORD ARMATURE REWOUND, $2.00

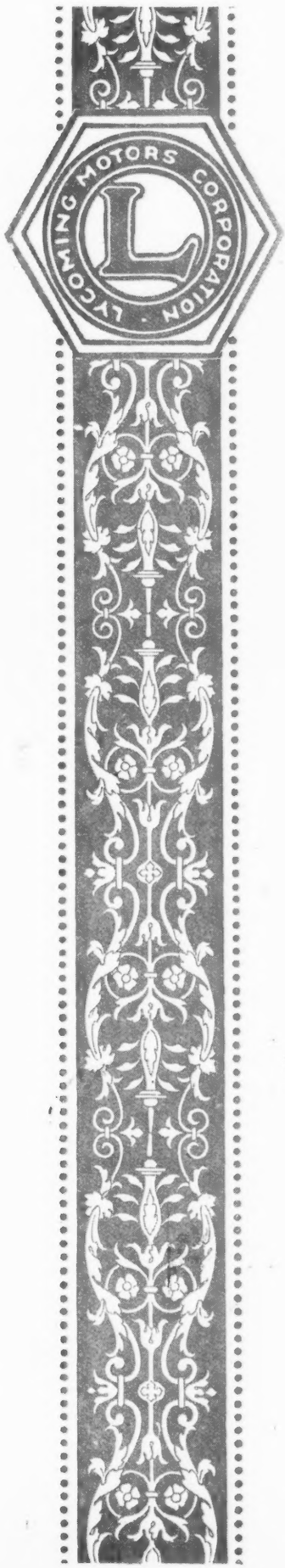
ANY TWO UNIT GENERATOR ARMATURE REWOUND $5.00

U. S. AUTO SUPPLY CO.

Armature Service Division

3845 S. Wabash Ave. Chicago, U. S. A.

"WHERE ARMATURE SERVICE  IS MADE A SPECIALTY—"



Advance Announcement
of the
LYCOMING 8-in-Line

ANTICIPATING the rising tide of demand for automobiles powered with motors of eight cylinders in line, this organization has had such a motor in process of development over a long period of time.

Having passed the experimental stage, working tests have now proceeded to a point where this new Lycoming creation can be offered for the consideration of a limited number of car makers for Spring delivery.

This new Lycoming was examined privately during the New York Show when it became apparent that the tendency of the industry and public demand toward this type of motor had assumed tremendous momentum.

For an organization which has devoted itself, for the past 14 years, to the production of fine four-cylinder motors, the new Eight-in-line is a logical development. It will maintain and enhance the established quality reputation of Lycoming Fours.

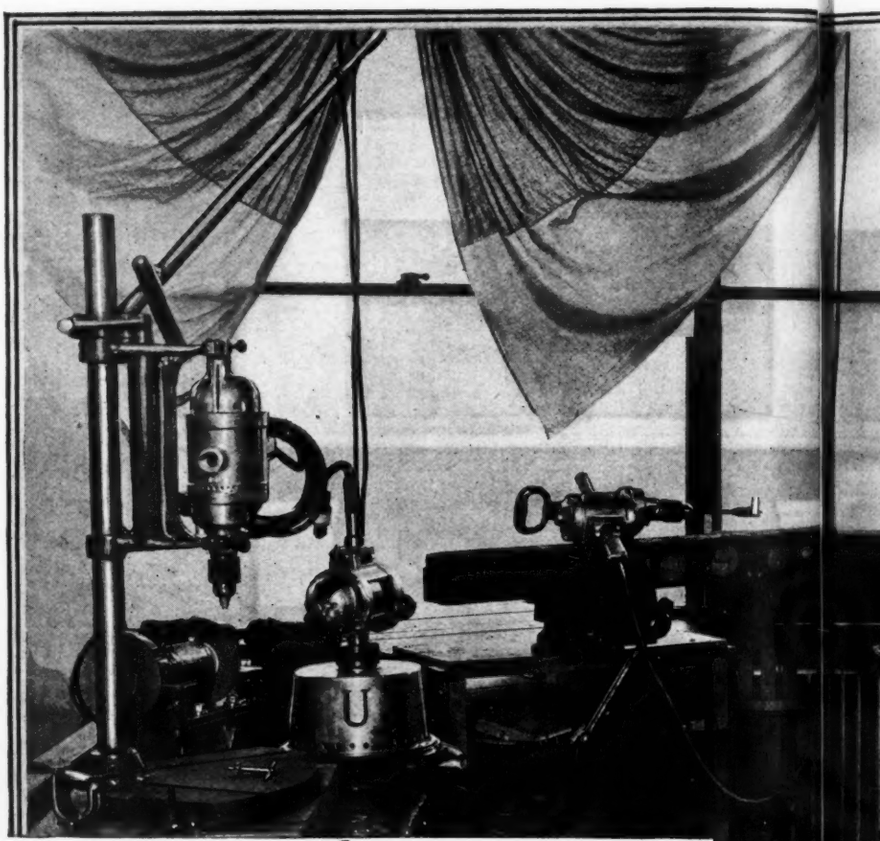
LYCOMING MOTORS CORPORATION, WILLIAMSPORT, PENNSYLVANIA.

LYCOMING
Motors

UNITED STATES

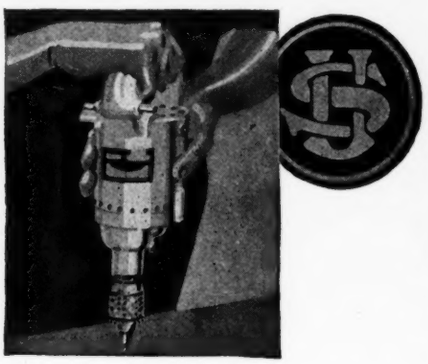
Whenever You See an Exhibit of U. S. Tools

Go In!



Compare the Weight

Just Wading In



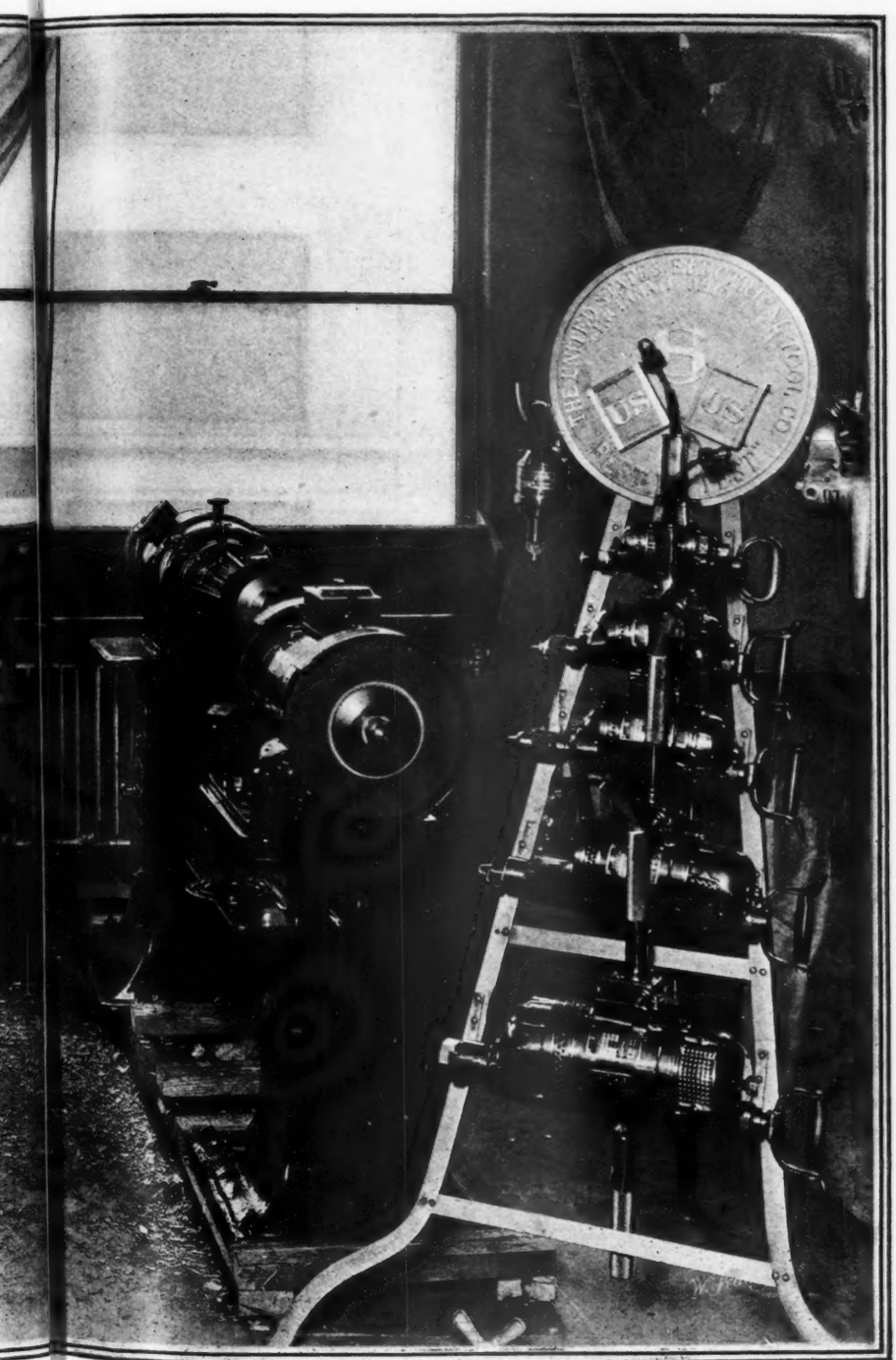
A Cool Running Drill

U. S. Drills are distinguished from all others by their lightness, perfect balance, power, speed, ruggedness and ease of control by means of the new under-the-finger switch.

They are built to stand the worst kind of abuse and are also distinguished by the total absence of freak features that give novelty but destroy efficiency.

Portable Electric DRILLS

Grinders Buffers Reamers



"The Good Mechanic Knows"

Jobbers!

We still have some good territory open. Write or wire today.

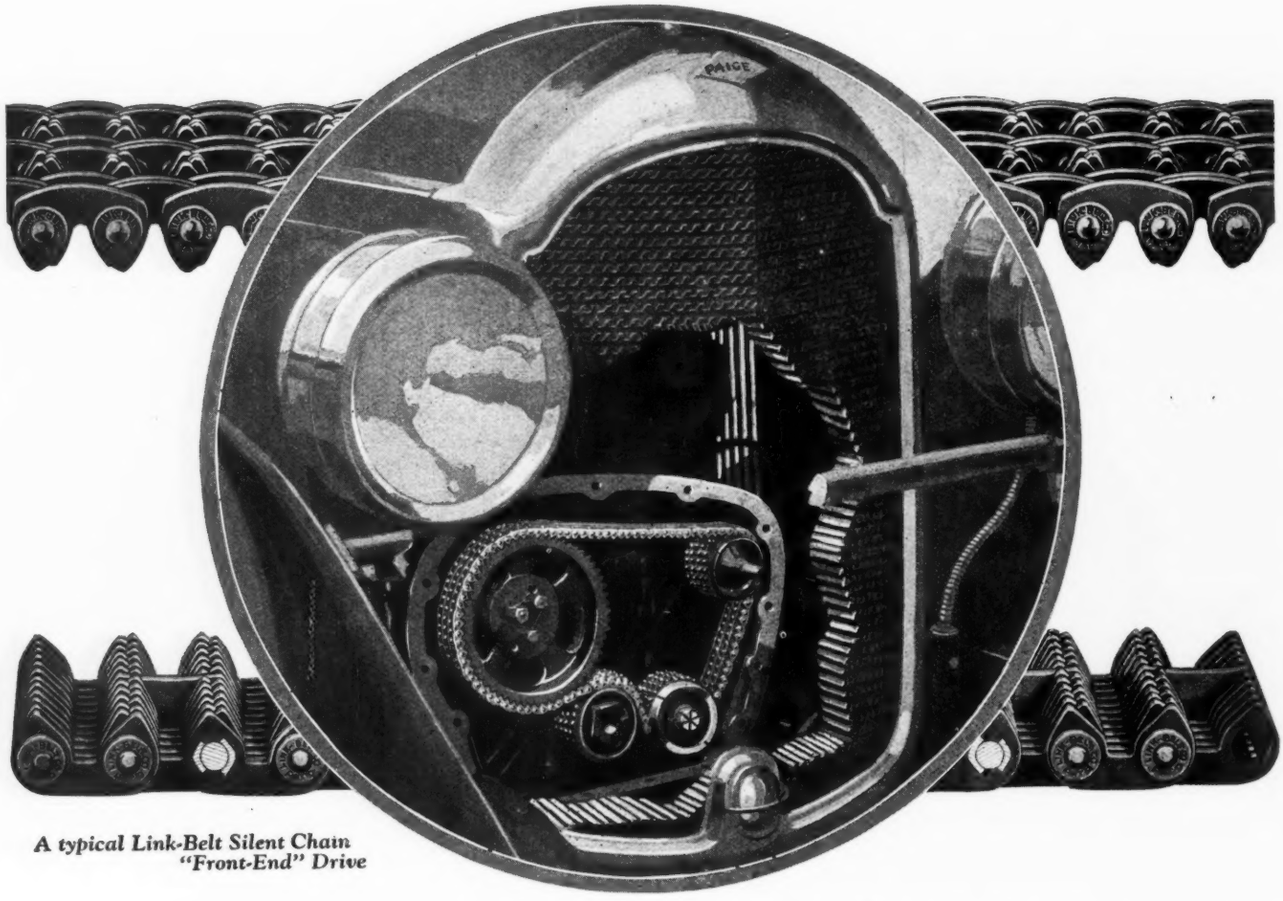
The UNITED STATES ELECTRICAL TOOL CO.
CINCINNATI, OHIO.

District Sales Offices and Service Stations

Boston	Detroit	New York
Buffalo	Houston	Philadelphia
Chicago	Indianapolis	Pittsburgh
Cleveland	Kansas City, Mo.	St. Louis
Columbus	Milwaukee	Toledo
	Minneapolis	

Complete stocks carried in all service stations

DRILLS VALVE GRINDERS — TIRE PUMPS BENCH GRINDERS



A typical Link-Belt Silent Chain "Front-End" Drive

Genuine Link-Belt S For All Chain D

LINK-BELT SILENT CHAIN "FRONT-END" DRIVES

are neatly packed in individual cartons—each chain wrapped in oil paper. Always in perfect condition.

NOW you can get the Genuine Link-Belt "Front-End" Silent Chain Drive—as a replacement chain or for use when a motor is being overhauled—from a nearby official Link-Belt Distributor.

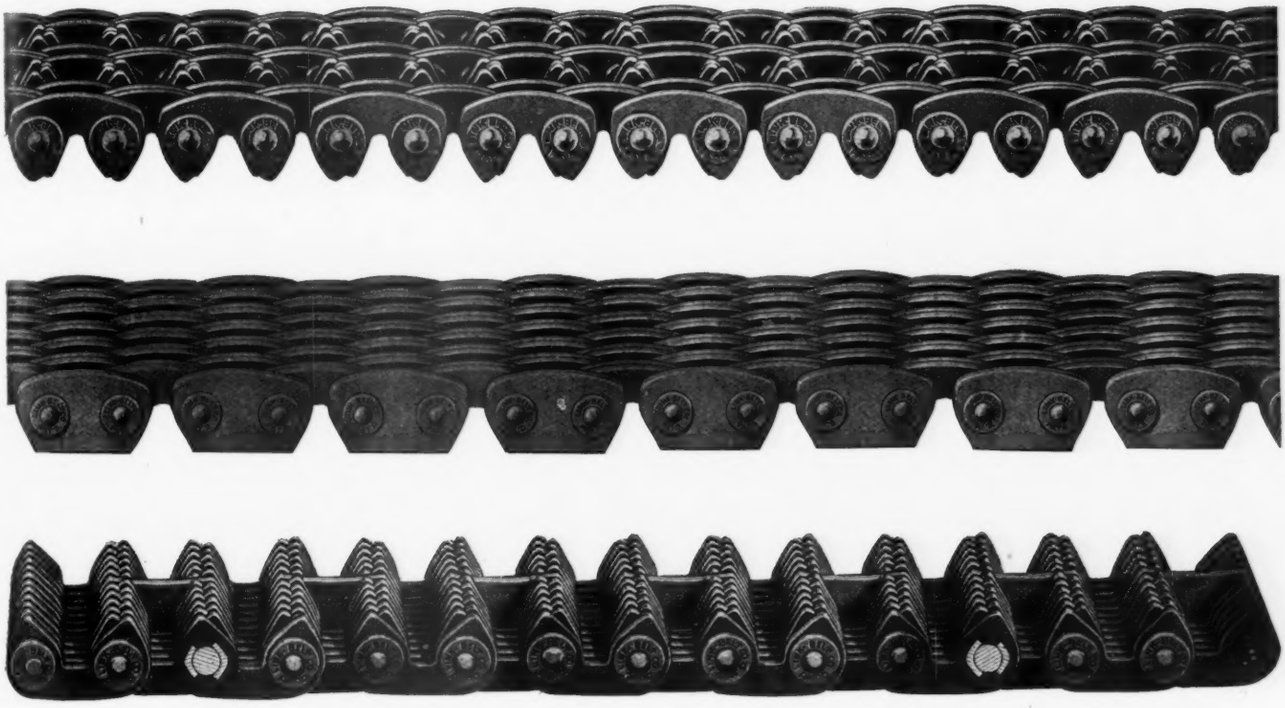
Now you can give guaranteed good service.

Made by the world's largest manufacturers of conveying and power transmission chains, Link-Belt Silent Chains embody features found in no other type of Silent Chain.

Note their construction—look at the round pin which operates between two hardened steel bushings. See how durability is really built into them. This is but one Link-Belt feature.

LINK-BELT

SILENT CHAIN FRONT-END DRIVES



Top: Link-Belt Silent Chain "Back Type" Center; Link-Belt Silent Chain "Side Flange" Type
Below: Link-Belt Silent Chain "Center Flange" Type
For your own protection—Genuine Link-Belt Chain bears our name on every washer

t Silent Chain Drive n Driven Engines

LINK-Belt Chains run in either direction. They are quickly and easily installed. For your own protection you should look for our name stamped on each washer.

One day away is a Distributor with a complete stock of Link-Belt chains for all cars. Each chain is tested, run-in, packed in a separate box, and labeled.

At your call it comes off the shelf instantly and goes into the mail. Next day your customer drives away perfectly satisfied.

There is also some rich territory still open to pushing distributors.

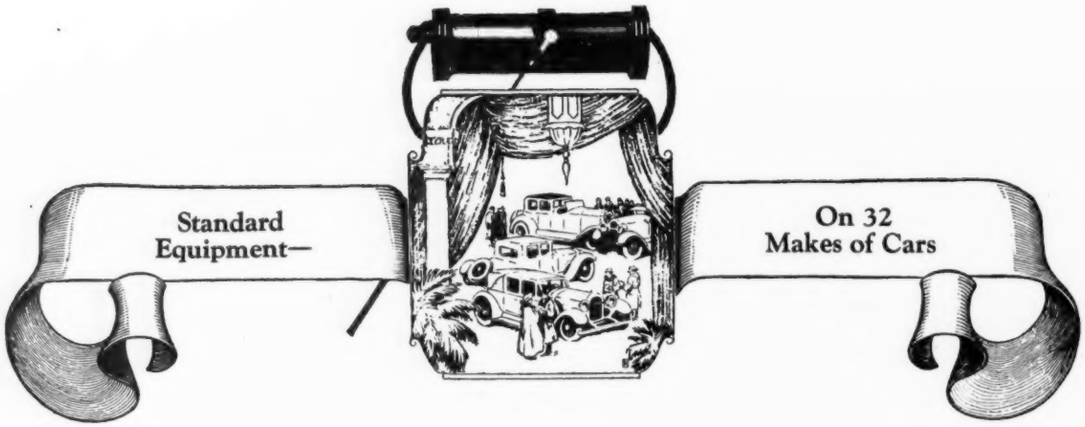
LINK-BELT COMPANY Indianapolis, Ind.

LINK-BELT SILENT CHAIN "FRONT-END" DRIVES

are neatly packed in individual cartons—each chain wrapped in oil paper. Always in perfect condition.

LINK-BELT

SILENT CHAIN FRONT END DRIVES



Motorists Know the Folberth as the Dependable Cleaner!

The Folberth is the *safe* cleaner to sell. It stays sold! There can be no dissatisfied customer, no comeback, or later servicing.

Nearly a million Folberth cleaners are now in service, each one giving satisfactory service.

The Folberth is the *easy* cleaner to sell. Car owners and prospective buyers attending the automobile shows all over the country see the Folberth as optional equipment on practically *all* cars, and standard equipment on the 32 makes listed below.

They are "sold" on Folberths as the dependable automatic cleaner.

There are 14,000,000 cars in service today in need of Folberths! Get your share of the profits to be made in this unlimited market with this great accessory.

These cars now install Folberths as Standard Equipment:

AMERICAN	DUESENBERG	LEXINGTON	RUBAY
APPERSON	ELGIN	LOCOMOBILE	STERLING-KNIGHT
AUBURN	FAGEOL	MARMON	STUDEBAKER
CASE	H. C. S.	McFARLAN	STUTZ
COLE	JEWETT	METEOR	TEMPLAR
CUNNINGHAM	JORDAN	NASH	WESTCOTT
DANIELS	KING	PAIGE	WINTON
DURANT-PRINCETON	KURTZ-AUTOMATIC	REO	
		RICKENBACKER	

This list is ever growing. Many other prominent manufacturers will be added. Also universally used by Street Railways, Suburban Electric Lines, Taxi and Bus Transportation Companies.

The Folberth is sold by all leading jobbers. Window display material and sales helps of all kinds are gladly furnished to the enterprising dealers. Ask your jobber or write.

THE FOLBERTH AUTO SPECIALTY CO., CLEVELAND, O.

FOLBERTH
Automatic
WINDSHIELD CLEANER

Photo by International Newsreel Corp.

A present for a former President—

and it's Allen equipped!

This fifteen thousand dollar Rolls-Royce production is the gift presented to former President Woodrow Wilson on the morning of his sixty-seventh birthday, by anonymous admirers. It was especially built for his comfort and embodies many refinements—naturally including an *Allen Shutter Front.* Two bodies, one for touring, with a high top to permit entering without stooping and one closed with a still higher top were included. Both bodies are made to fit on the standard chassis.

We want to send you full details about the Allen Shutter Front at $15.00. It's a real money maker for you and a necessity for every motorist.

THE ALLEN AUTO SPECIALTY CO.
16 West 61st Street, New York City
2015 Michigan Avenue, Chicago

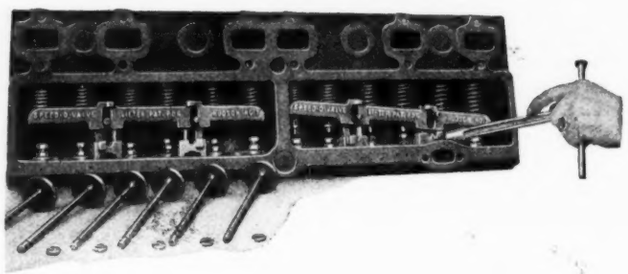
ALLEN *SHUTTERFRONT*

NOT AN AUTOMATIC

"Makes *all year* motoring a pleasure for the motor"

SPEED-O MULTIPLE VALVE SPRING LIFTER

Lifts 4 to 12 Valve Springs in Less Than 30 Seconds



THE IMPROVED 1924 SPEED-O VALVE LIFTERS

No.	Order by the Numbers	
1.	Ford	$2.25
2.	Lincoln	10.00
3.	Dodge	5.00
4.	Jordan	5.00
5.	Maxwell	7.00
6.	Continental—Fits All 7R and 8R Motors	12.00
7.	Hudson	8.00
8.	Cadillac	10.00
9.	Studebaker—Fits Special and Big Six	
10.	Packard—Single Six	
11.	Packard—Straight Eight	

Trade Mark Reg. U. S. Patent Office
Patented and Pat. Pdg.

Speed-O in the Service Station

Speed-O Valve Lifters have been developed with the idea of placing in the hands of service station mechanics a new tool that enables them to do a profitable service operation with greater ease and comfort to themselves, and a greater return in profits to the service and repair shop operator.

Speed-O makes it possible for a mechanic to remove and replace a set of valves ten to twenty times faster than any other method. No more handling one spring at a time.

Figure out for yourself the saving in time, the increase in profit, and the satisfaction from your customers' point of view in a good job, well done, at a more moderate cost.

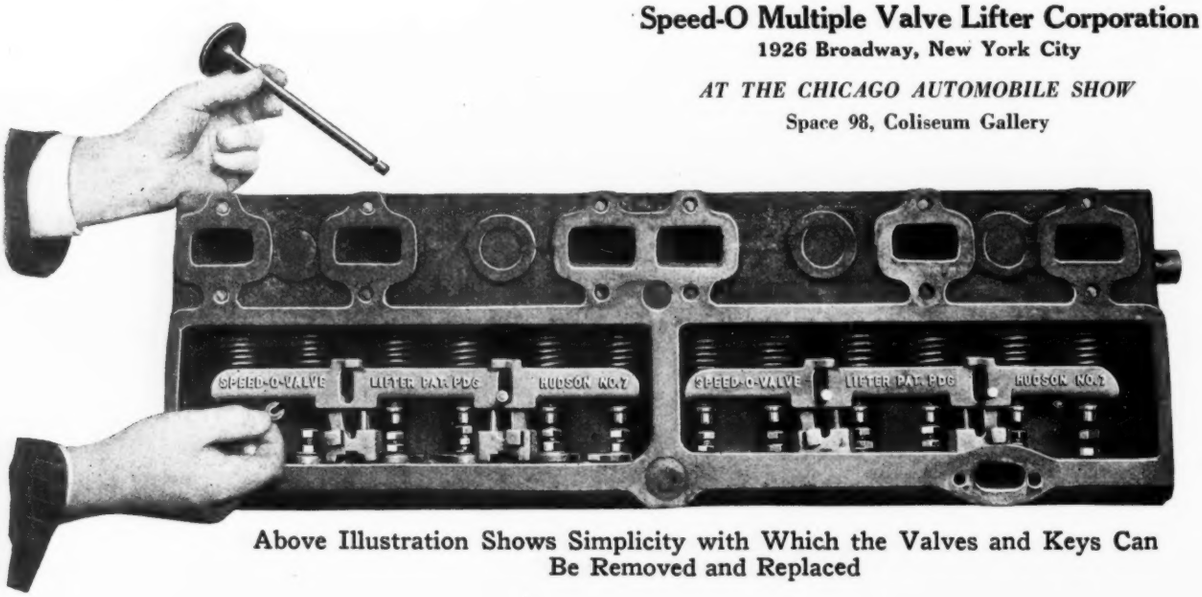
You do a lot of valve grinding and it's a profitable service operation. Why continue in the old way, when Speed-O sets a new pace and makes possible a saving in time and labor.

Place one or two multiple valve spring lifters in your shop and watch the results. Your time cards will show the difference in time-saving, your costs in profit-making.

Get a Speed-O Valve Spring Lifter from your dealer today. You'll be surprised how little it costs and how much it saves.

Speed-O Multiple Valve Lifter Corporation
1926 Broadway, New York City

AT THE CHICAGO AUTOMOBILE SHOW
Space 98, Coliseum Gallery



Above Illustration Shows Simplicity with Which the Valves and Keys Can Be Removed and Replaced

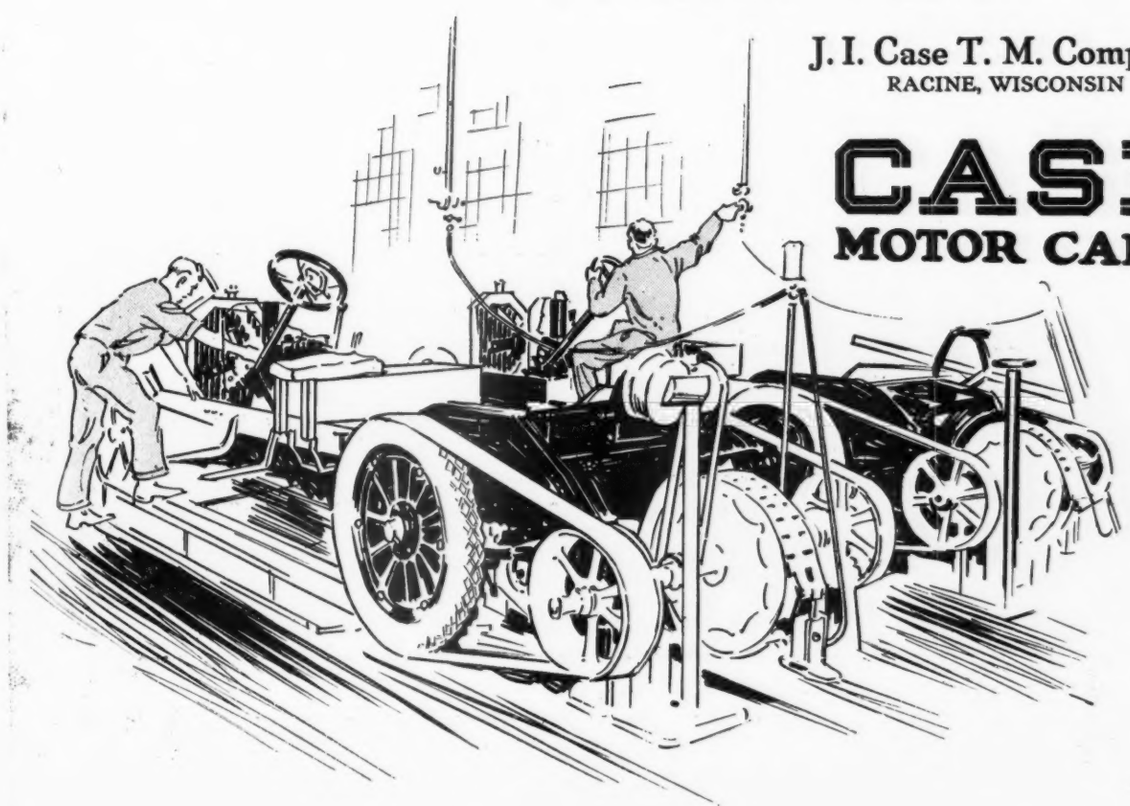
How Case Precision in Manufacture Guards Case Dealers Against Loss

IN THESE days of frenzied production, many dealers find that an alarmingly high percentage of their profits is being absorbed by pre-sale labor and service costs.

Case dealers, by way of contrast, are not acquainted with these two "profit thieves." Careful building and exacting inspection practically eliminates the necessity of the dealer spending his money to correct factory carelessness.

Each motor—though purchased as a unit—is torn down for inspection. Bearings are expertly fitted by hand. Exhaustive block tests determine the motor's fitness before it is mounted. Completed chassis are cradled and run for hours at various speeds to properly wear-in transmissions and differentials. Each chassis receives a thoro road-test before the body is mounted. Finally, the completed car is given another road-test to check up on possible squeaks, rattles, etc.

It costs more to make motor cars this way. To make our cars as nearly satisfactory as possible before they leave the factory, does hold down our production—but, then, we aspire to more than just volume. Year by year Case motor cars are being made increasingly fine.

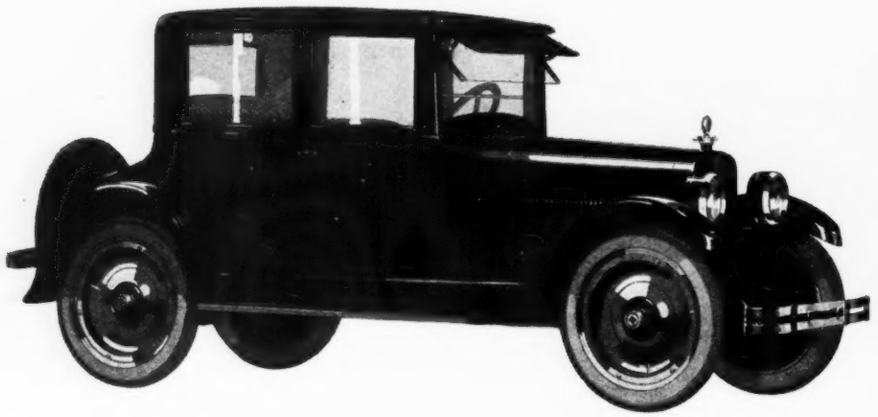


J. I. Case T. M. Company
RACINE, WISCONSIN

CASE
MOTOR CARS

Rickenbacker

A · CAR · WORTHY · OF · ITS · NAME



Remember—
Rickenbacker Told You So!

Over 50% of the cars exhibited at the New York Automobile Show were equipped with 4-Wheel Brakes.

This was in response to insistent demands of buyers as expressed through salesmen and dealers.

The buyer, having once experienced the greater safety and efficiency of this fundamental improvement, said, "I want that!"

And when an American buyer demands, the maker has no option—he must comply.

Today, the buyer is repeating those words so often and so emphatically, every maker must accede—or pay the penalty.

"Has this car 4-Wheel Brakes?"

That was the first question you heard when you stopped at any exhibit in the Auto Show.

And the next question generally was, "Are they internal expanding brakes mechanically operated?"

But, several other innovations and improvements that were emphasized by several makers as new in this show—but which you saw in the first Rickenbacker Six—also indicated the impress of this product on the entire industry.

12 Cars now boast "vibrationless Motors." And it is interesting to note the several expedients applied in efforts to emulate the results of Rickenbacker's "Tandem Fly Wheel."

9 Cars emphasized "deeper frames"—though none as yet, approaches the eight (8″) inch dimensions of the Rickenbacker "Double Depth" frame.

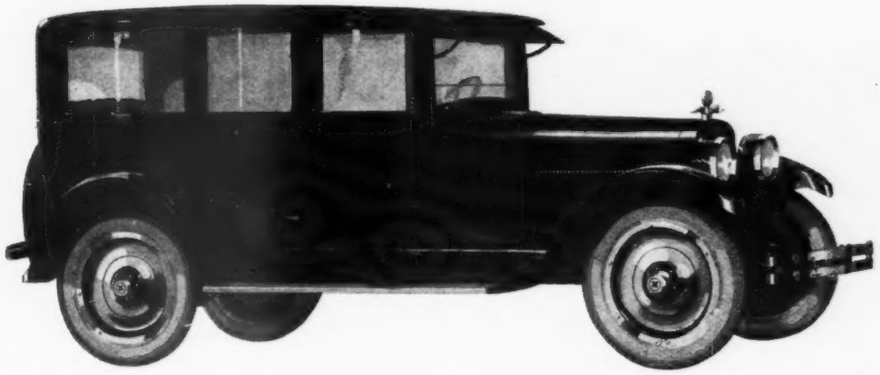
6 Cars showed springs set nearer the ends of the rear axle—nearer the point of contact between tire and road. This is one of the features of Rickenbacker "Cradle" spring suspension.

There are several other points, however, that are still to be found only in this car.

4 ~ Wheel Brakes

Rickenbacker

A · CAR · WORTHY · OF · ITS · NAME



6 Cars have "Air Cleaners" of one kind or another—in emulation of Rickenbacker's provision for "protecting the lungs of the motor."

Fully 75% of all makers now feature steel disc wheels—first announced as standard on the first Rickenbacker Six.

5 Cars feature ball bearings in steering spindles — all of these are much higher priced cars than Rickenbacker, by the way.

5 Cars show the commutator located above motor, away from dirt, water and oil. This also you first saw in the Rickenbacker Six.

Rickenbacker showed in New York for the first time in the world's history, standard models at standard prices, so completely equipped as to leave the new owner "Nothing Else to Buy."

Rickenbacker models this year are equipped with all those safety devices and conveniences which the seasoned motorist considers essential, and for which, heretofore, you have paid extra.

Not only the customary speedometer, ammeter, volt meter, pilot light, oil gauge and switch-lock on the instrument board;—

But also transmission lock, Folberth wind-shield cleaner, combination vanity and smoking case, Motometer, Motometer wings, Motometer lock, shock absorbers, and bumpers, both front and rear.

The open models—Sport Phaeton and Sport Roadster—also have beveled plate-glass wind wings.

All models are equipped with drum tire-covers with lettered warning "4-Wheel Brakes," which is for the benefit of the man behind, and which never fails to give the Rickenbacker man right of way. This is Rickenbacker's interpretation of the term "fully equipped" as exemplified in these latest models.

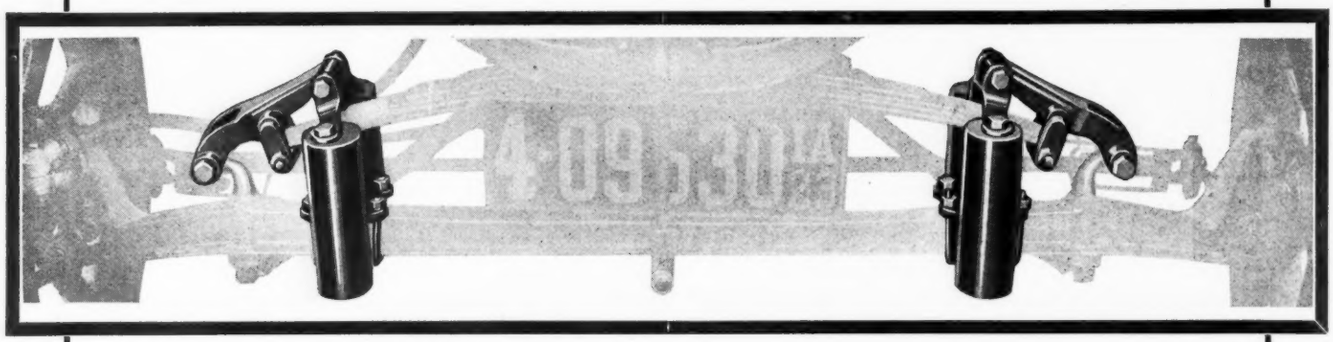
In advanced engineering, Rickenbacker is the outstanding leader. In style, the fashion plate. In Pride of Ownership—unique.

Rickenbacker Motor Company
Detroit, Michigan

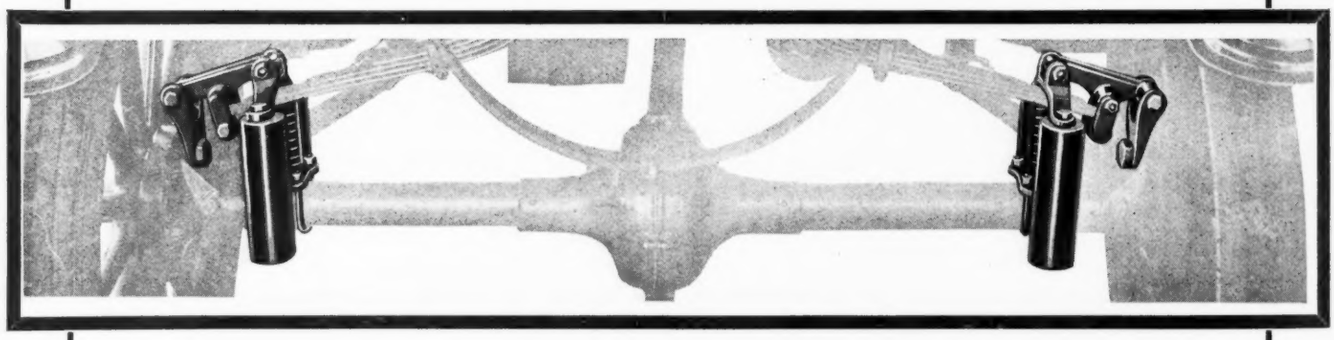
Sport Phaeton, $1595 Sport Roadster, $1645 Coupe, $2035 Sedan, $2135 f. o. b. Detroit

4 ~ Wheel Brakes

VESELY



SHOCK



ABSORBERS

for Fords

15 DAYS FREE TRIAL

Let any customer try them for fifteen days, and refund his money if he isn't thoroughly satisfied in that time. There's no surer way to quick sales than that. Will the sales stick? Well, no buyer has asked for his money yet.

A new application of double levers makes the Vesely shock absorber smooth out the roughest road under a Ford. Built big and sturdy, there is no service trouble with them: they don't wear out or break. They don't change the hang of the body. No alterations in installing.

Good, sure, profit; no trouble; plenty of repeat business. Get a stock now.

Territory open to hustling distributors.

J. L. LEHMAN & CO.

Sales Representatives

CEDAR RAPIDS, IOWA

GURNEY
BALL BEARINGS

For Speed and Load SAFETY

Use them because they rate higher in capacity, due to more and larger balls for a given bearing size.

Because they simplify design due a single radio-thrust unit replacing separate radial and thrust bearings.

Let the Gurney Engineers help you solve your bearing problems.

GURNEY BALL BEARING CO.

402 Chandler St.,
Jamestown, N. Y.

A Profitable Addition to Your Store

Crosley Model X-L

MODEL VI—$30. A wonderfully efficient two tube set, one stage of Tuned Radio Frequency Amplification and Detector.

MODEL X-J—$65. A four tube radio frequency set combining one stage of Tuned Radio Frequency Amplification, a Detector and two stages of Audio Frequency Amplification. A jack to plug in on three tubes for head phones, the four tubes coupled up for loud speaker.

MODEL X-L—$140. A duplicate of Model X-J except the arrangement and mounting into a beautiful cabinet with the addition of a built-in loud speaker and space in the cabinet provided for housing the necessary batteries. Special mahogany stand for Model X-L—$25 extra.
Cost of necessary accessories, $40 up.

THE demand for Radio Equipment is universal. It is the big, new business of today. You are neglecting a real opportunity if you overlook the profits a good Radio Line will bring to your store.

Crosley Radio Receivers and Parts offer an ever-increasing volume of business to the progressive automotive dealer.

The Crosley Line is recognized everywhere as, "Better—Cost Less"—fine enough for the highest class trade yet within reach of all. From the two tube Crosley Model VI at $30 to the beautiful Consolette Model X-L at $140, the Crosley Line contains a receiver that will give complete satisfaction to every one of your customers.

Cash in on the tremendous demand for Crosley Radio Products—created by consistent national advertising and proven performance.

WRITE FOR COMPLETE CATALOG, SENDING US THE NAME OF YOUR JOBBER.

THE CROSLEY RADIO CORPORATION

Powel Crosley, Jr., President
Formerly
The Precision Equipment Company and Crosley Manufacturing Company
1534 ALFRED ST. CINCINNATI, OHIO

The Largest Manufacturer of Radio Receivers in the World

"Cincinnati Junior"
1-4" Drill $28.00
1-2" Special Drill $58.00

You don't have to "Baby" this drill

THE Cincinnati Portable Electric Drills have the real stuff in them to take the cuffs and kicks of real work and to give you holes and lots of them—quickly, continuously and at low cost.

They are light and well-balanced and easy to use. They have every adjustment that is necessary to keep them perfectly tuned up, and they are more accessible than any other drill you ever saw. Every real mechanic appreciates a design that not only does its work well, but that is easy to "get at." You never have to tear the whole drill down to reach the brushes or the commutator.

The ball bearings save power—and the little motor is a "bear"! It's a product of good honest materials, and close workmanship; the kind of tool the real mechanic appreciates! The Cincinnati line is complete including portable electric drills; grinders and buffers of all sizes. Mention your jobber's name when you write.

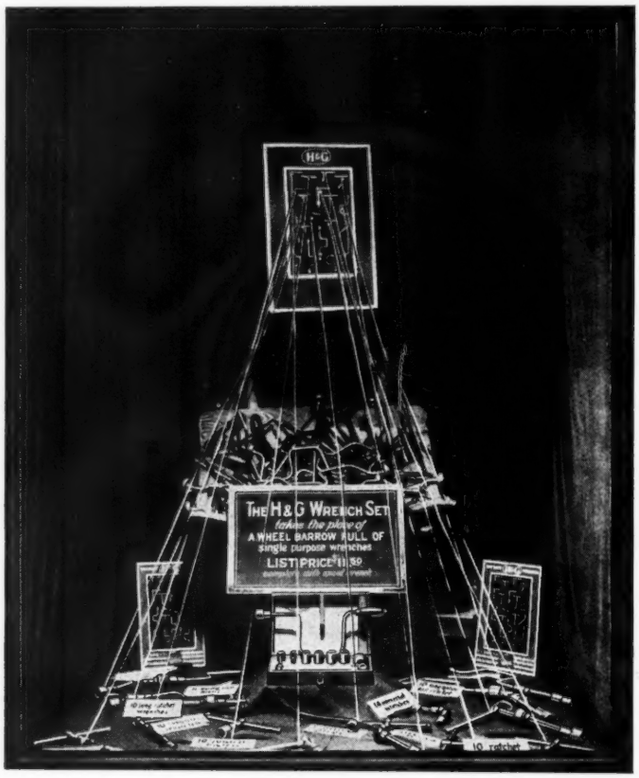
Specifications: Universal motor, ball bearings; three-jaw geared chuck; rubber covered cable fitted with steel clad attachment plug; detachable side handle.

THE CINCINNATI
ELECTRICAL TOOL COMPANY
1515 Freeman Ave., Cincinnati, Ohio

New York.....50 Church St.
Philadelphia.....1220 Real Estate Trust Bldg.
Buffalo.....280 Carolina St.
Cleveland.....517 Bangor Bldg.

Standard since 1902

The Cincinnati
Electric Drills-Grinders-Buffers



H&G

Wrench Set

140 Combinations in One Set

10 Short Tee Handles
10 Long Tee Handles
10 Short Lever Wrenches
10 Long Lever Wrenches
10 Speed Wrenches
10 Long Speed Wrenches
10 Short Wrenches with Ratchet
10 Long Wrenches with Ratchet
10 Short Wrenches with Universal
10 Long Wrenches with Universal
10 Speed Wrenches with Ratchet
10 Long Speed Wrenches with Ratchet
10 Box Wrenches
2 Short Screw Drivers*
2 Long Screw Drivers*
2 Speed Screw Drivers*
2 Long Speed Screw Drivers*
2 Screw Drivers with Ratchet
*Blades can be removed and horn type valve grinder inserted.

$160 Worth of WRENCHES for $11.50

HERE is a wheelbarrow full of single-purpose tools that cost $160. In the box is the H & G Wrench Set, price $11.50, with which you can make every type and size wrench in the wheelbarrow.

Which is the better investment?

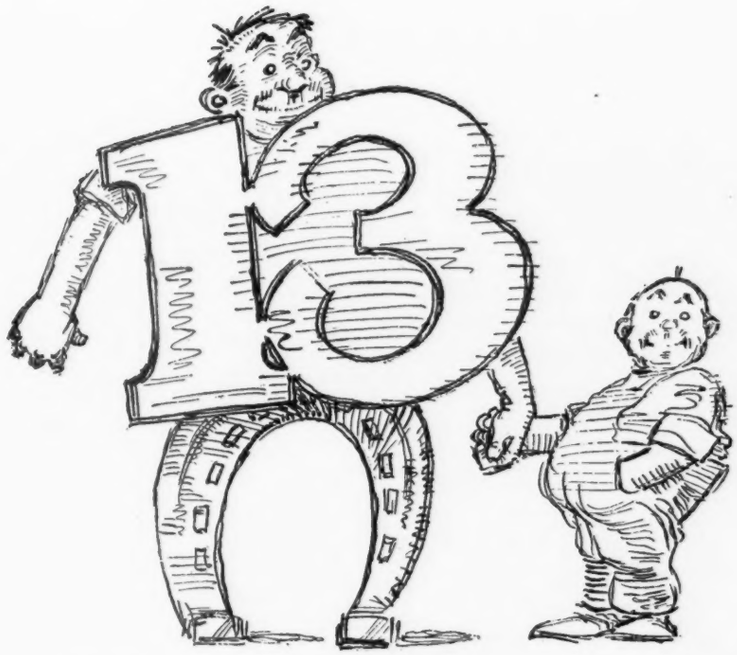
You need an H & G Wrench Set. It is cheaper to own and a better investment because you get the best and strongest sockets and parts ever made. You make the type of wrench you want by clapping the parts together. Over 140 different combinations at your service. Guaranteed not to slip, break or whip.

This H & G Wrench Set is endorsed by thousands of mechanics and recommended to service stations by the leading motor car manufacturers. Sold through legitimate jobbers exclusively. Fully guaranteed. Write for sample socket.

THE EASTERN MACHINE SCREW CORPORATION
10-20 Barclay Street, New Haven, Conn.

H & G

Wrench Set



Hello—How's Things Brakin?

GEORGE WILLETS who runs a garage out in Eastern Ohio writes in suggesting a trade figure for Testbestos.

George says in his letter "make this gink just a big 13 with a grinning face on it and some arms and then use a horseshoe for legs"

George's idea is that the Testbestos Assortment of 13 sizes, with which 90 per cent of all brake lining jobs can be handled, is worth featuring strong.

Well it is—and here's the trade figure. All right George?

But this 13 assortment really does save a lot of grief. It cuts down the stock you have to carry. Saves tieing up money in sizes little used and simplifies the whole proposition from start to finish.

Besides which when you put Testbestos on a car you're putting on the best brake lining money can buy—every foot of it guaranteed.

Try Testbestos at our risk —if you don't know our nearest jobber — use the coupon.

American Asbestos Co.
Norristown, Pa.

The Lucky 13

These 13 sizes of TesTbesTos are all you need carry in stock to take care of 90 percent of your relining jobs. Your jobber can supply other sizes promptly.

	For
1-1/8 x 5/32,	Fords
1-1/4 x 5/32	
1-1/4 x 3/16	
1-1/2 x 5/32	
1-1/2 x 3/16	
1-3/4 x 3/16	
2 x 5/32	
2 x 3/16	
2-1/4 x 3/16	
2-1/4 x 1/4	
2-1/2 x 1/4	
3 x 1/4	
2 x 1/4	

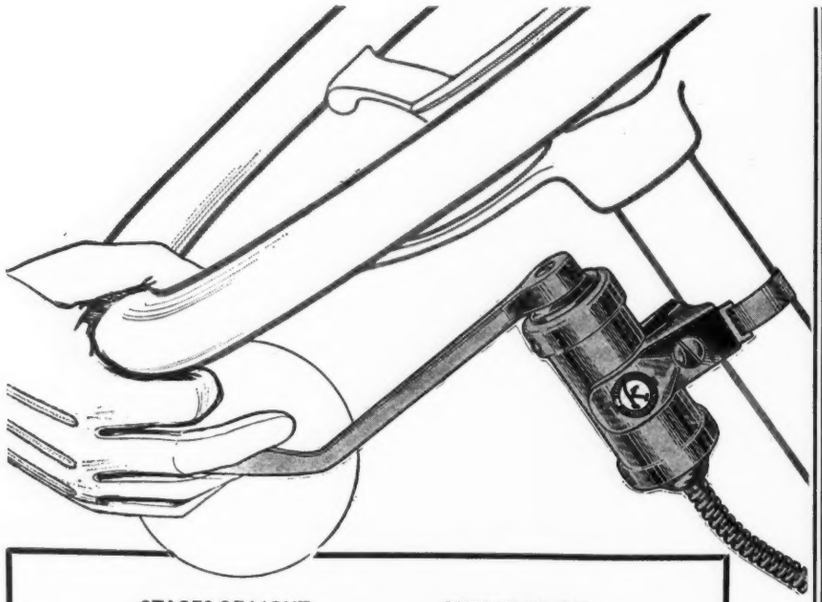
REG. U.S. PAT. OFF.
TESTBESTOS
AUTOMOBILE
BRAKE LINING

AMERICAN ASBESTOS COMPANY
Norristown, Pa.

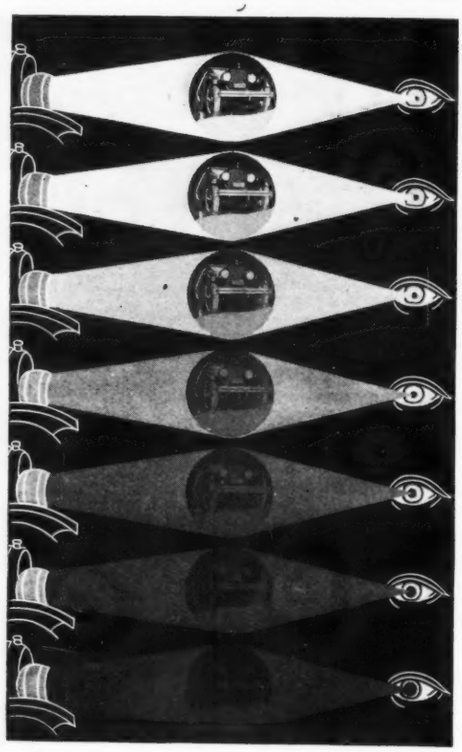
Please send me the name of the nearest TesTbesTos jobber.

Name .....

Address .....



STAGES OF LIGHT EFFECT ON EYE



Note how gradual dimming allows the pupil of the eye to enlarge without danger of blind spots—caused by a too sudden change from bright to dim. The eye follows the seven stages of Lorentzen Headlight Kontrol naturally without strain or effort.

The Seven Stages of Lorentzen Headlight Kontrol

SUDDEN dimming is dangerous! It blinds you at the wheel—the oncoming driver or pedestrian. The eye can't span the gap between light and dark quick enough. Momentary "blind spots" cause accidents.

Gradual dimming is the only *safe* way. Dim the lights through seven successive stages and the eye will follow naturally—without blinding.

Easy to Operate

Keep your hands on the wheel, your feet on the pedal, your eyes on the road. Have your headlights under control of your finger tips!

The Lorentzen Headlight Kontrol comes in two sizes to fit all cars. The price is $7.50—a low price for SAFETY and easy headlight control.

It will look good on your car—heavily nickel plated and polished. The simple mechanism can't stall or get out of order. Easily attached in 10 minutes.

LORENTZEN HEADLIGHT KONTROL, Inc.
60 Grand Street, New York

ASK YOUR JOBBER—HE KNOWS.

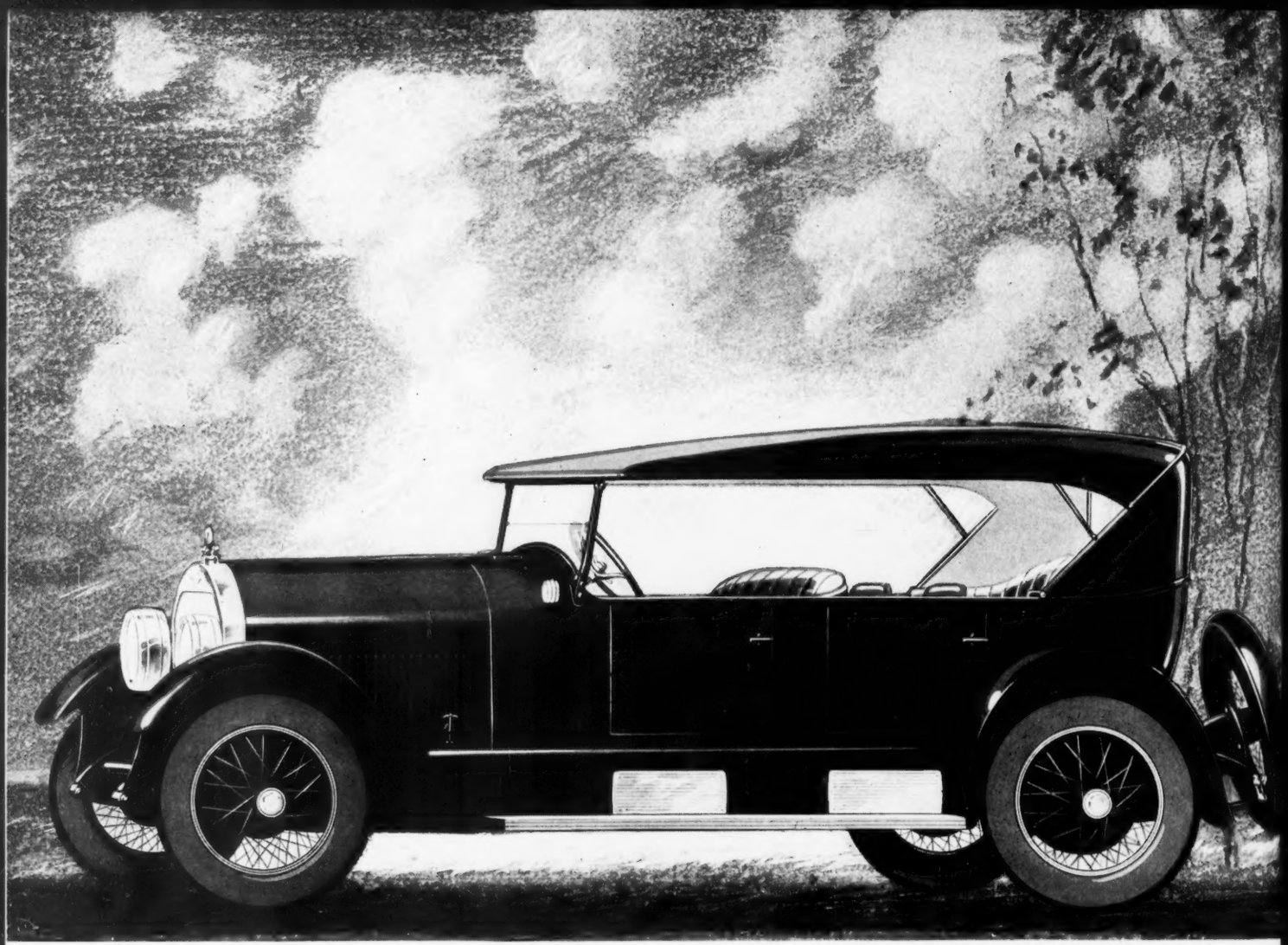
Don't wait for his salesman to call—write him.

LORENTZEN Headlight Kontrol

(Patents Pending)

"Makes You Like to Drive at Night"

New
New
New
NEW
CAR THAT MA
GOD IN A DAY



STUTZ SPEEDWAY SIX TOURSTER, SEVEN-SEATER

Introducing

The Stutz Speedway Six

and the greater Stutz line for 1924 which positively blankets the fine car field

AGAIN the vast resources of the Stutz have made possible another brilliant triumph. Those who predicted that the second year under the guiding hand of Charles M. Schwab and his associates would find the Stutz prolific of even greater opportunities now see their anticipations realized.

The greater Stutz line for 1924, including the new Stutz Speedway Six, fairly bristles with possibilities for merchants of highest caliber.

It positively blankets the fine car field. It offers not only the most comprehensive selection of open and enclosed models ever produced in the history of the Stutz Motor Car Company of America, Inc., but—

with prices which absolutely revise previous standards it gives to trade and

S T

STUTZ SPEEDWAY SIX SPORTSTER, FIVE-SEATER

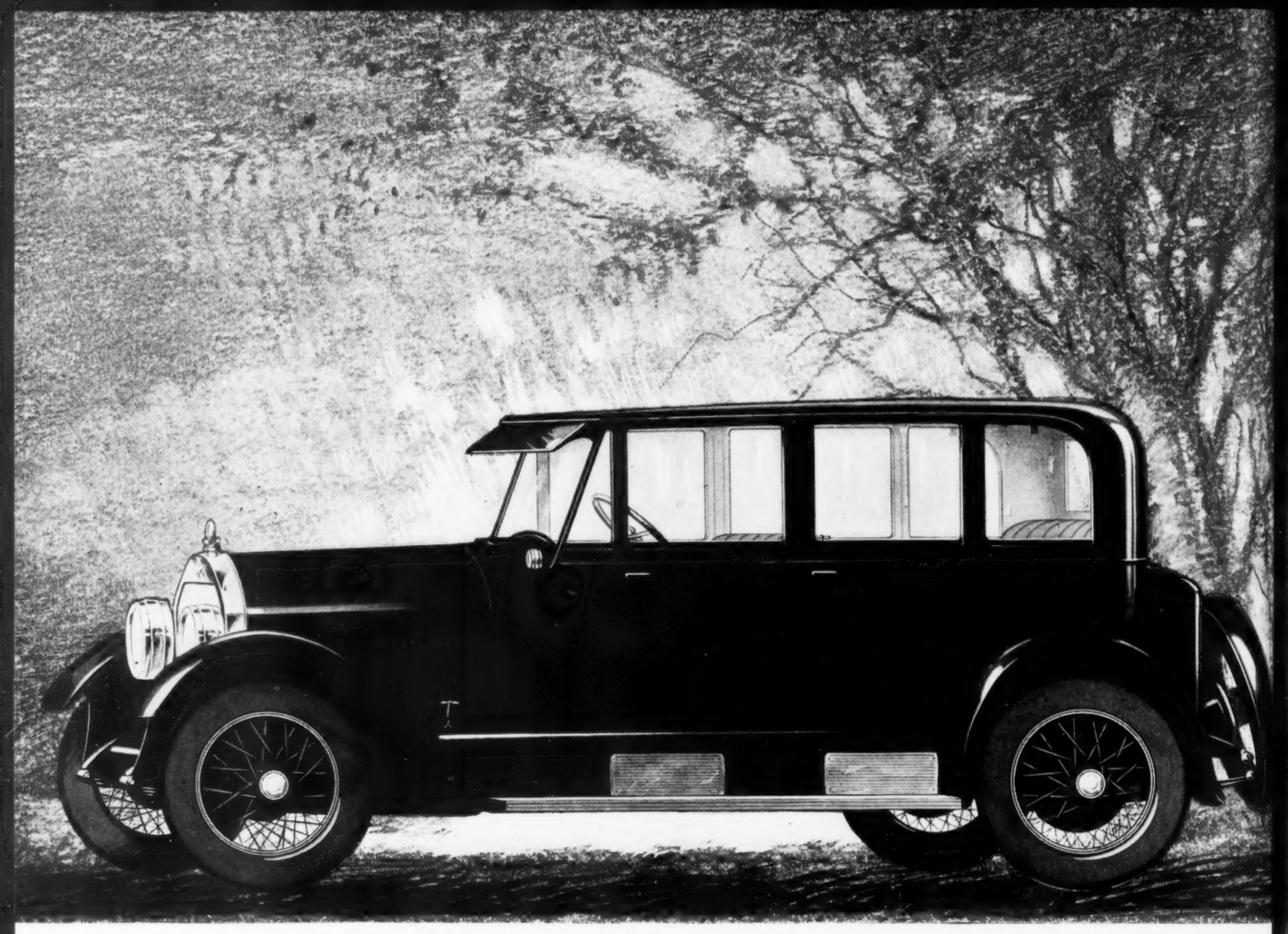
public, alike, motor car values positively without precedent. Never were cars so fine priced so low.

14 Exquisite Body Types
3 Exclusive Chasses

Consider what opportunity awaits those dealers who are successful in obtaining the franchise which will enable them to offer this array of cars to buyers who heretofore have been compelled to pay far more even to approach them in class and quality.

Think of the vast market now opened to dealers who, with the greater Stutz line, can place at the disposal of the public the most comprehensive selection of recognized class cars now available, at prices no greater than are asked for quantity production cars whose very numbers limit their individuality and distinction.

Here are custom conceptions so highly individualized as to prevent confusion with *any* other makes—class conveyances which impart unmistakable prestige because their designs are so conceived that only Stutz engineering genius and manufacturing methods can duplicate them.



STUTZ SPEEDWAY SIX SPORTBROHM, FIVE-SEATER

Here are chasses of absolutely exclusive construction—of three complete and distinct types countenancing not a single compromise—which embody a host of acknowledged advancements to be found, if at all, only in cars selling for many hundreds of dollars more.

Here are cars which live up in every way to the traditions which have placed the Stutz in a class with only the three or four recognized leaders among America's preëminent quality cars, yet have such a highly significant advantage over all competition in point of price.

Here, in short, is a line of automobiles which enables the best merchants everywhere to provide *everything* that the most sophisticated buyer may demand, or the most fastidious may require, on a basis that assures greater immediate profit and holds more certain future possibilities than any other available line of high-grade cars.

The phenomenal success of the Stutz Special Six—introduced just a year ago—encouraged the Stutz Company to extend its operations still further in the six-cylinder field.

The Stutz Speedway Six is the result!

STUTZ SPEEDWAY SIX SUBURBAN, SEVEN-SEATER

Also in Berline Type with Adjustable Glass Partition

THE NEW STUTZ SPEEDWAY SIX

(130-inch Wheelbase)

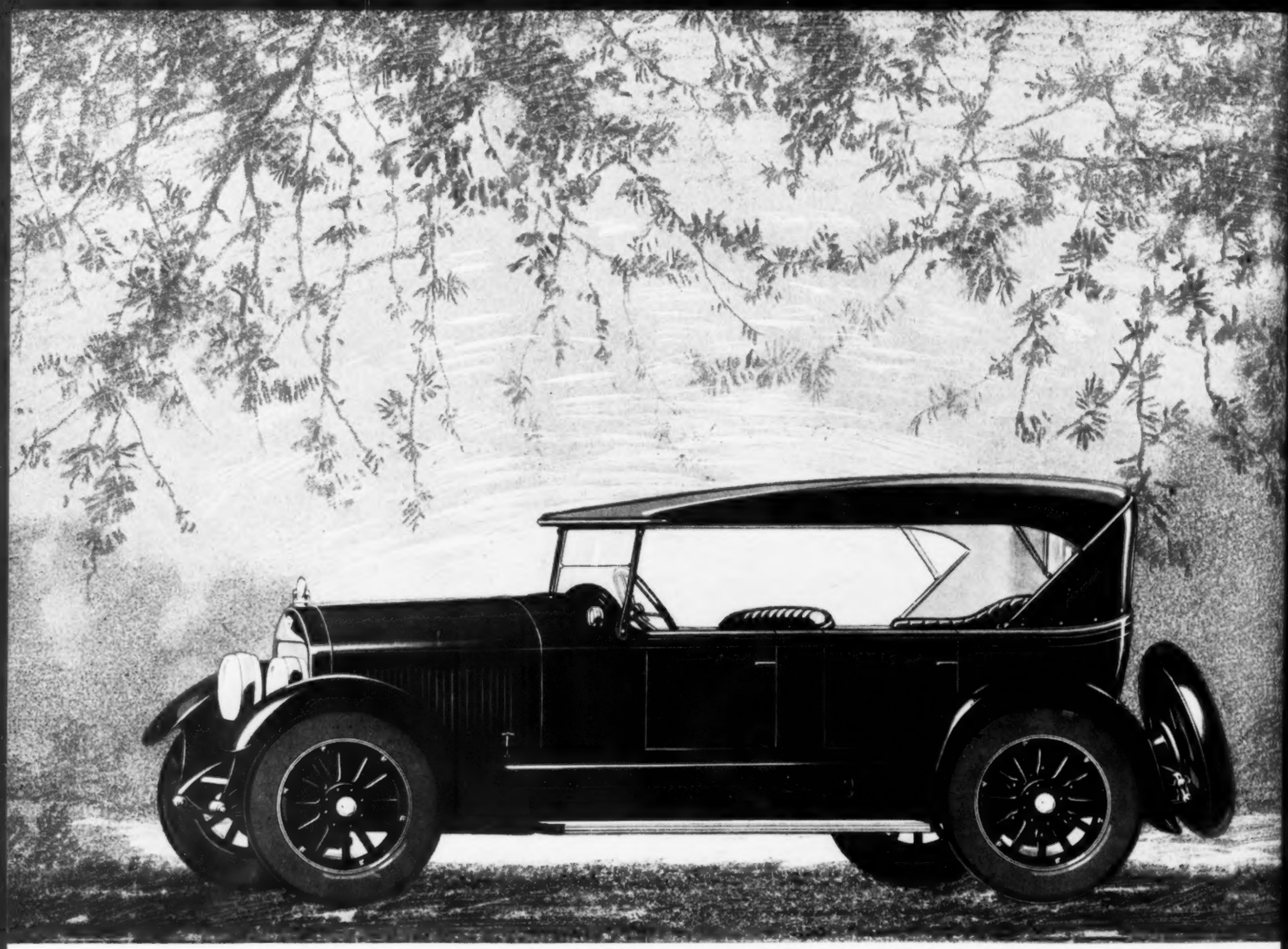
Taking its place beside the Stutz Special Six and the famous Stutz Speedway Four, the Stutz Speedway Six unfolds even greater opportunities for capitalizing Stutz prestige.

Slightly larger than the Stutz Special Six, in order to accommodate a full line of seven-passenger as well as five-passenger patterns—

a trifle higher in price, yet offered at a figure several hundred dollars less than any comparable cars—

the Stutz Speedway Six brings to the complete Stutz line an assemblage of open and enclosed equipages of characteristic Stutz beauty, *individuality*, and charm, which are destined to gain rapid recognition.

Together with the nine other types available on the Special Six and Speedway Four chasses, the new Stutz Speedway Six models go to make up one of the most encompassing exhibits of truly fine cars which the present market affords.



STUTZ SPECIAL SIX PHAETON, FIVE-SEATER

The pictures presented here give only a meager impression of these masterly creations. They are so replete with features of unusual fascination and appeal that they deserve careful inspection at the earliest moment.

High Torque, Super-economy Engine
(3½″ x 5″—80 h. p.—70 m. p. h.)

Like the Stutz Special Six and Speedway Four, the new Stutz Speedway Six presents something superior in engine efficiency.

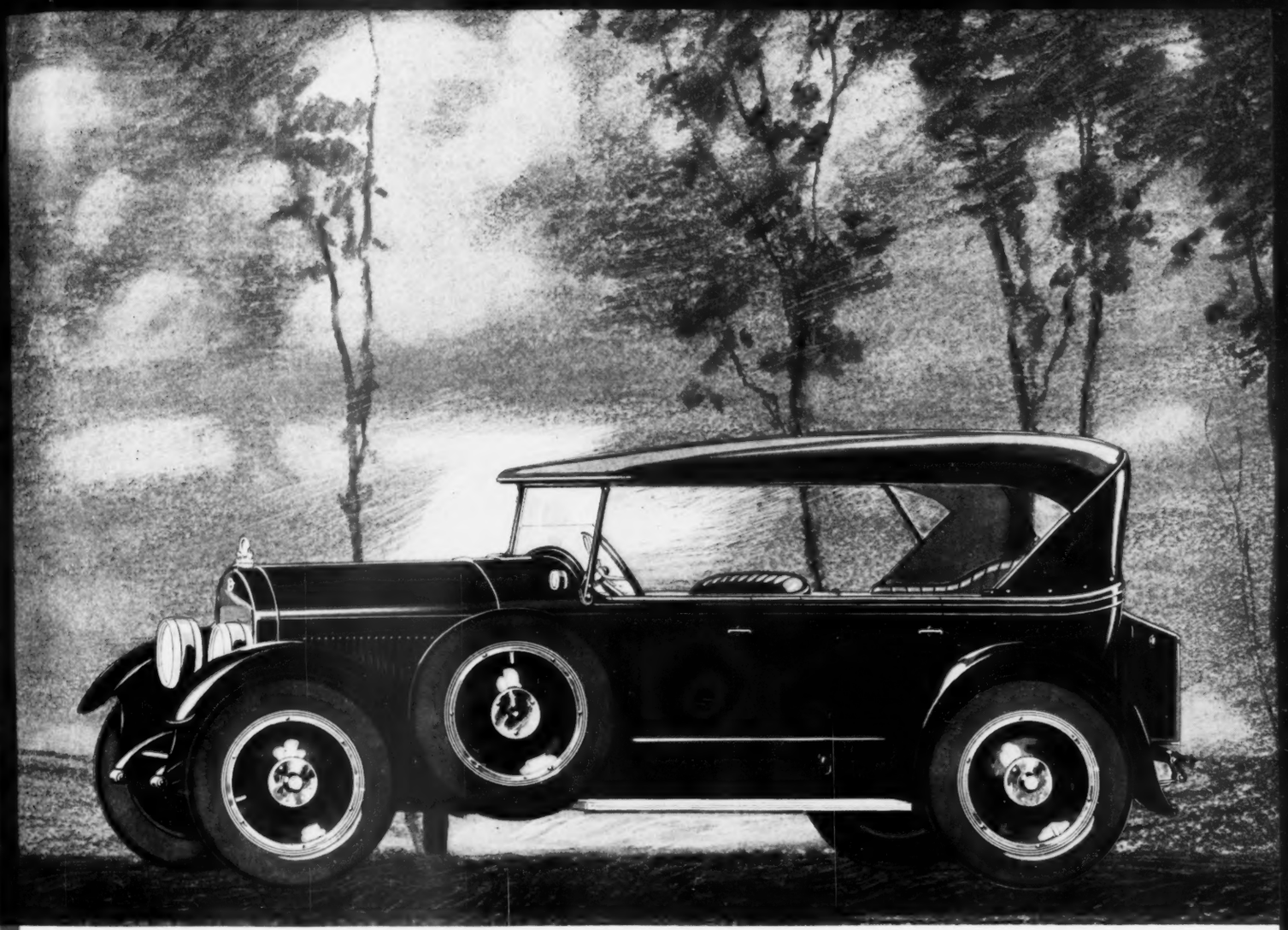
Its power plant is exclusively its own —*Stutz-built from first to last.*

Vested with characteristics that amaze even seasoned experts, the Stutz Speedway Six engine introduces features never before perfected in six-cylinder, valve-in-head design.

Torque is so irresistible and smooth that test hills everywhere are negotiated at *slower* speeds in high gear than ever before seemed possible.

By the same token, acceleration is so spontaneous and rapid that it veritably defies comparison.

Speeds so great can be attained and *held indefinitely* with such unbeliev-



STUTZ SPECIAL SIX TOURABOUT, FIVE-SEATER

able silence and ease that previous stock car performances are no longer a measure of efficiency.

And withal, economy of fuel and lubricant is so surprising that even under the most extreme conditions mileage on gas and oil exceeds what ordinarily is expected only in uninterrupted travel at moderate speeds over long stretches of favorable road.

Camshaft construction, crankshaft balance and rigidity, valve operation, lubrication and general accessibility in the Stutz Speedway Six engine embody features nowhere else obtainable, but which are destined to exercise a determining influence on all future automobile practice. They are worthy of closest investigation.

Comfort and Ease of Operation

Riding comfort which can not be obtained without Stutz compensating spring design—

facility of control introducing utterly new ideas in easier steering, shifting, clutch operation and braking—

road balance which only the Stutz gooseneck frame suspension and 10-point body mounting make possible—

STUTZ SPECIAL SIX ROADSTER, THREE-SEATER

and a host of other acknowledged structural advancements, give the Stutz Speedway Six as great individuality in mechanical construction as it has in external appearance.

Self-adjusting Quadraulic Brakes and Balloon Tires

Self-adjusting, four-wheel, *hydraulic* brakes (Lockheed type)—conceded to be the most complete and perfect quad-braking system available—are optional at a small additional cost.

As well, the latest air-cushion tires, with all the necessary mechanical adjustments to assure maximum efficiency in steering and roadability, are provided if desired.

No matter how swift may be the pace in automotive engineering, the present imposing line of Stutz Sixes and Fours will remain, indefinitely, far ahead in their field, so completely engineered are they in every respect.

In mechanical science and in coach design as well, Stutz has wrought a line of cars destined for permanent leadership, upholding all for which the Stutz is famed and adding much to give it even greater prestige.

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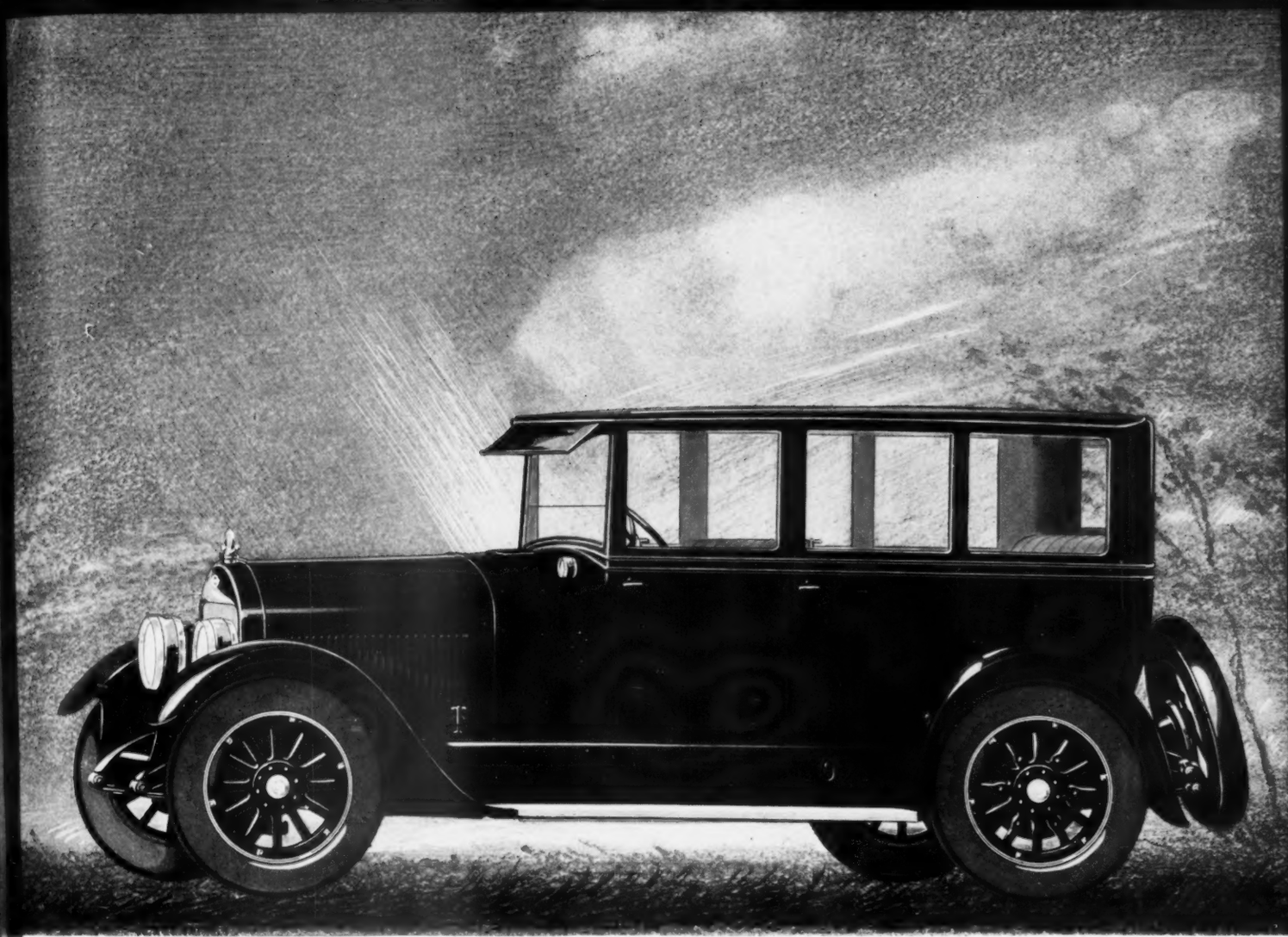


STUTZ SPECIAL SIX SEDAN, FIVE-SEATER

THE STUTZ SPECIAL SIX

(120-inch Wheelbase)

Known as perhaps the most thoroughly owner-attested car ever marketed, the Stutz Special Six—with its powerful 3⅜ x 5-inch, 75-h. p. engine—now enters into the second year bettered in every possible way and augmented by stunning new body types.

A car which, during its very first year, was responsible for so astounding an increase in production that the original building program of its makers was more than trebled the first ten months, the Stutz Special Six promises to eclipse its meteoric record in 1924.

Literally hundreds of owner letters give irrefutable proof of the phenomenal worth and efficiency of this really sensational car.

No other car at so amazingly low a price ever has offered a chassis so replete with features typical only of the highest-priced cars or has been capable of the behavior or economy of the Stutz Special Six.

STUTZ SPEEDWAY FOUR BEARCAT, TWO-SEATER

Furthermore, Stutz dealers will tell you that the service requirements of the Stutz Special Six are less than for any comparable car—that no car at any price offers greater durability, dependability and freedom from care.

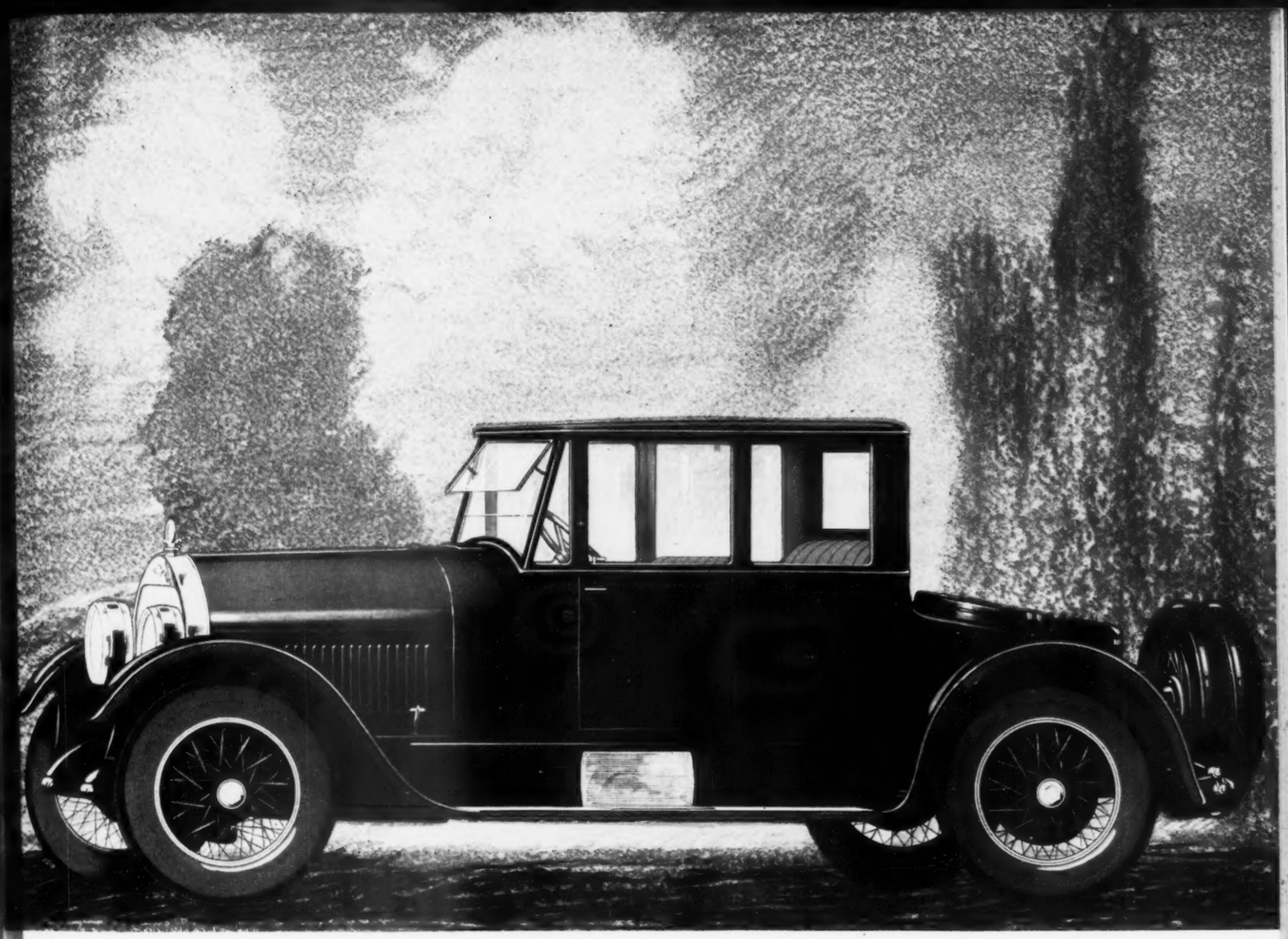
The more extensive selection of bodies now offered on the Special Six chassis includes astounding values, offering the finest enclosed types at prices no greater than are asked for open models of comparable quality.

THE STUTZ SPEEDWAY FOUR

(130-inch Wheelbase)

In addition, commanding its exclusive clientele of those who never can be satisfied short of the fascinating sense of mastery and power it imparts, is the Stutz Speedway Four, with the famous Stutz "D-H" engine—America's preëminent sports car. There is not and never has been another car of such peculiarly distinctive character. Its popularity is never waning.

Furnished in five appealing designs and in a wide variety of color options,



STUTZ SPEEDWAY FOUR SPORTCOUP', FOUR-SEATER

the Stutz Speedway Four may be highly personalized for the distinguished trade to which it caters.

Individuality Beyond Imitation

With the Stutz Speedway Six, the Stutz Special Six and the Stutz Speedway Four, the Stutz Motor Car Company of America, Inc., provides the dash and flavor in a world of many motor cars of increasing similarity—augmenting the fascination and prestige of Stutz ownership.

Consider the strategic position of the Stutz dealer organization with a line of cars so comprehensive as shown on these pages, at such sensational prices. *Watch the buying public—long aware of the fineness of Stutz production—clamor for these unprecedented values.*

No cars at a higher price place the Stutz at a disadvantage, while in most respects a Stutz can not be equaled no matter how much more is paid.

The Stutz line for 1924 embraces America's most pronounced values in the field of cars of acknowledged class—values which are destined to absolutely dominate their market during the coming year.

WATCH STUTZ GROW!

FROM January 1, 1923, to date the Stutz distributor and dealer organization increased to three times its former size. During the same period Stutz production more than doubled that of the previous year.

Not a single car was forced on any distributor or dealer. There was no overloading at any time. Not a penny of Stutz dealer profit was wasted in carrying charges on excessive stocks.

How many other companies offering cars of equal appeal are there who can cite a more favorable record and at the same time show as healthy an increase in business?

But the Stutz account is *intended* to make money for Stutz dealers. It is supported by policies which for liberality and soundness are unsurpassed.

Besides, Stutz dealers are protected against price declines. Their contract is perpetual—not subject to momentary cancellation.

Discounts on cars and parts afford an adequate margin of profit—one that does not depend on enormous volume to make money. It eliminates the necessity of reckless trading.

And, in addition, it gives the dealer a line of cars in a price class that is less competitive than any other—a class where inherent value is accorded an equal chance with superficial show, where discriminating, experienced buyers want real distinction in the cars they purchase.

That is why the Stutz appeals to them—why they are seeking it in ever-increasing numbers.

But the Stutz franchise offers more than this. It has one unique advantage which no other comparable franchise now available in any way affords.

The Stutz gives you access to the broadest fine car market now open to any automobile made, regardless of price.

Preserving its individuality in every respect, affording fourteen models of exclusive design and three chasses of unapproached excellence, the greater Stutz line for 1924 appeals to every wish and caprice of the most select motoring taste.

The very variety of the present Stutz line, alone, tremendously widens the Stutz dealer's market.

But more important is the fact that the Stutz appeals powerfully not only to the motoring public reached by cars in its general class—

IT OPENS TWO GREAT ADDITIONAL MARKETS!

First: *The greater Stutz line has access to a market not usually reached by a car so fine.* This market is attracted by the Stutz price range—for the Stutz is the lowest-priced really fine car made. Thousands of buyers *are willing to pay a little more to own a Stutz!*

Second: *The Stutz sells in volume in the market which is not usually reached by a car so low in price.* This market is attracted by the fascination of Stutz ability and prowess, the distinction which Stutz ownership imparts, and a consciousness that the soundness of Stutz engineering is not surpassed at any price. Thousands with whom cost is no question buy Stutz cars *because they know that though the price is low a Stutz-built car offers all that money can buy.*

Before you sign another car contract ask yourself if it opens as big a market to you as does the Stutz with a really *complete* line of *fine* cars that meet every requirement.

Consider if any other available line offers as fair a franchise to safeguard your business and perpetuate your efforts.

Do not overlook the financial strength of the Stutz and its ability to meet the exacting requirements of the day and see if you can afford to miss the chance *to grow with the Stutz and build permanently and soundly for all time to come.*

Write or wire today for complete information regarding the greater Stutz line for 1924 and its possibilities in your territory, or see our representatives at the Shows:

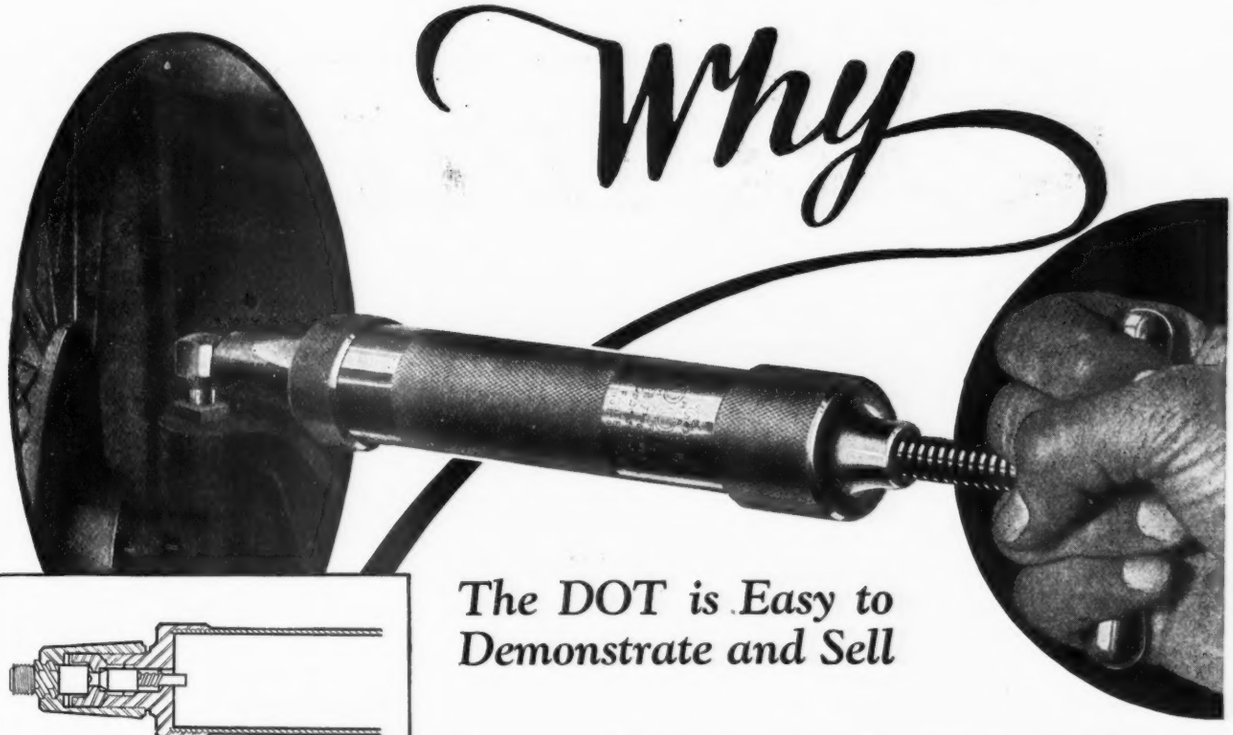
NEW YORK, January 5 to 12. 258th Field Artillery Armory, Space 3. Special Exhibit and Headquarters, Commodore Hotel.

CHICAGO, January 26 to February 2. Coliseum Annex, Space 40. Special Exhibit and Headquarters, Congress Hotel.

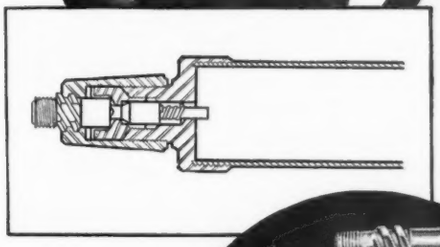
STUTZ MOTOR CAR COMPANY OF AMERICA, *Inc.*, Indianapolis, Ind.

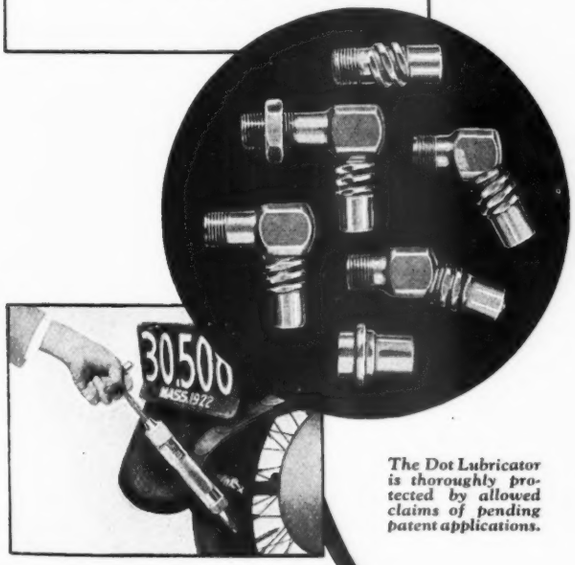
Builders of the Original and Genuine Stutz Motor Cars

Why



The DOT is Easy to Demonstrate and Sell





The Dot Lubricator is thoroughly protected by allowed claims of pending patent applications.

Look at the cross-sectional diagram of the DOT automatic valve shown on the left. It automatically opens and closes itself, retaining any desired pressure from *one to three thousand pounds.*

Thus with one hand alone, the operator connects the nozzle to the nipple, turns to the right and it *locks*—perfectly leakproof. Another turn to the right forces out the spent grease and forces in fresh lubricant. A turn to the left disengages the nozzle and the automatic valve closes, retaining the lubricant ready for the next operation.

One-piece steel nipples with elbows of every angle bring the remote lubricating points within easy reach. No awkward stretching. No greasy hands or ruined clothing. That is why the DOT High Pressure Lubricating System gives quicker, cleaner and more thorough lubrication than any other system. No other lubricator wins such instantaneous approval as the DOT. One demonstration sells it.

Made only by

Carr Fastener Co., 31 Ames St., Cambridge, Mass.

Branches

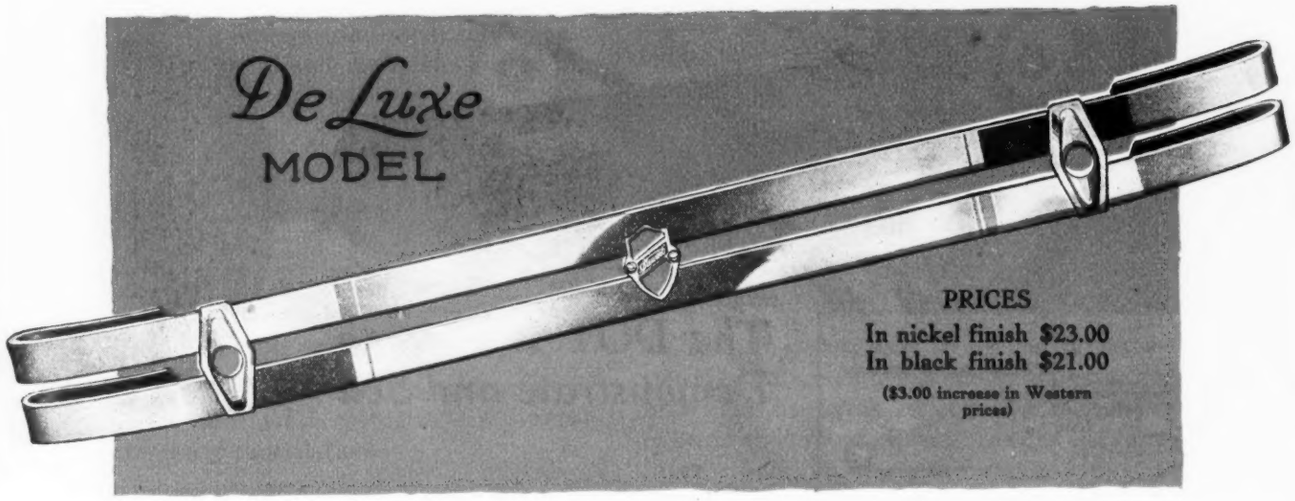
40 Selden Ave. Detroit — 47 W. 34th St. New York City — Monadnock Bldg. San Francisco — Gage Ave. & Beach Rd. Hamilton, Ont., Canada

DEALERS

Are you prepared to give DOT Service to the many motorists and fleet owners now using the DOT? Are you prepared to meet the demands of motorists who want to install the DOT on their cars? No single item lends itself to such attractive display and no accessory is so easy to demonstrate and sell as the DOT. Why not cash in on this profitable line? Send for the "Handy Service Kit" and make your store the DOT Headquarters in your town. Dealer helps, cards, signs, electros, etc. furnished free to dealers.

The DOT (TRADE MARK) high pressure LUBRICATOR

Stewart



Stock This Profit Making Line

The Stewart Name-Plate

The Stewart Bumper is the most widely imitated bumper on the market.

Through our national advertising we are educating car owners to look for the red Stewart name-plate, and avoid imitations.

Call your customer's attention to this name-plate so they will know they are getting the genuine Stewart Bumper.

Immense Advertising Campaign

Stewart Bumpers will be backed throughout 1924 by the biggest advertising campaign in the history of motor car accessories.

Full page Saturday Evening Post advertisements, a coast-to-coast billboard campaign, sixty big newspapers, The Country Gentleman and other magazines will create a Stewart Bumper demand that you can cash-in on.

Easy Installation

The Stewart patented "universal" installation fits more than 50% of the present-day motor cars. Easy to install and stays on.

Quick Service

With Stewart Service Stations in over fifty large cities throughout the country, every one carrying a complete stock of products and parts, dealers can obtain unusual quick service from a nearby station, and save on handling charges.

Packing

The fitting sets for Stewart Bumpers are packed separately. Dealers can carry a small number of fitting sets and a fair supply of rails, and take care of their trade without overcrowding their stock space.

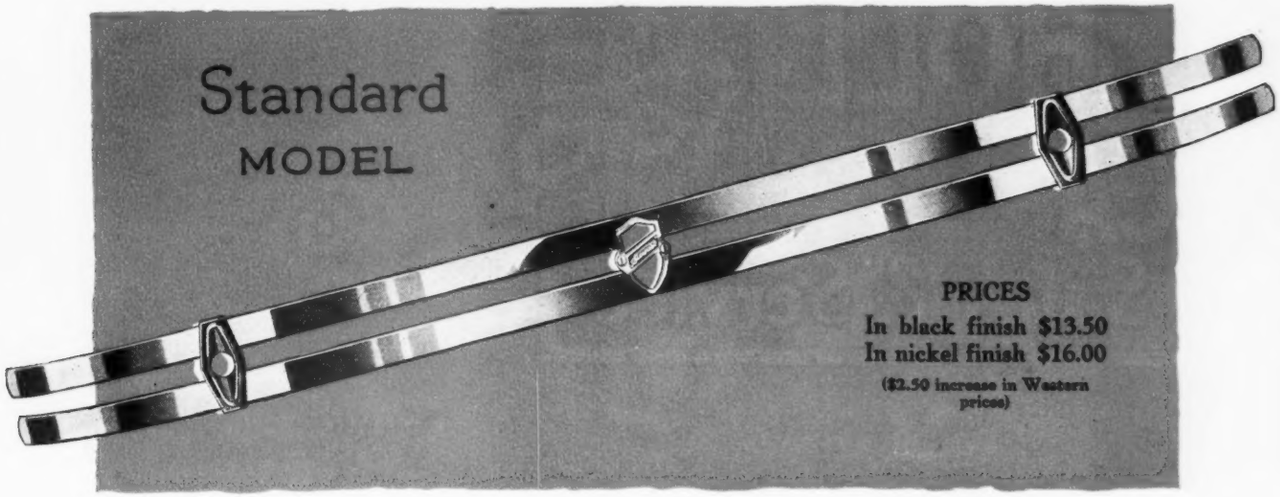
STEWART-WARNER SPEEDOMETER CORPORATION
CHICAGO • U. S. A.

Stewart

CUSTOMBILT ACCESSORIES

USED ON 9 MILLION CARS

BUMPERS



Double-Bar Protection Full Width of Car

100% Protection

The fenders are more open to damage than any other part of the car. That's why we designed Stewart Bumpers to give complete fender protection. Both big broad parallel bars extend the ***full width*** of the car—a feature of Stewart protection worth remembering.

All-Steel Construction

All parts of a Stewart Bumper, from start to finish, are constructed of steel. No cast iron parts to snap from a blow. This all-steel construction is another big Stewart feature.

Beautiful Mirror Finish

The highly polished mirror surface of the broad parallel bars with the snappy red center name-plate makes the Stewart the "bumper beautiful." Protection and strength ***with*** beauty!

STEWART-WARNER SPEEDOMETER CORPORATION
CHICAGO U. S. A.

SPECIAL MODELS

Special FORD Models priced from
$12.75 to $16.25

Special CHEVROLET Models priced from
$12.25 to $16.50

Special OVERLAND "4" Models priced from
$13.25 to $16.25

($2.50 increase in Western Prices)

Stewart

CUSTOMBILT ACCESSORIES

USED ON 9 MILLION CARS

How Ford Owners Will Know You Sell It

Ford owners around you who have read the Holley Hot Shot advertisements in the Saturday Evening Post want to know which local dealer sells this device. Put up the Holley Sign! See how it will help you "cash in" on our National Advertising.

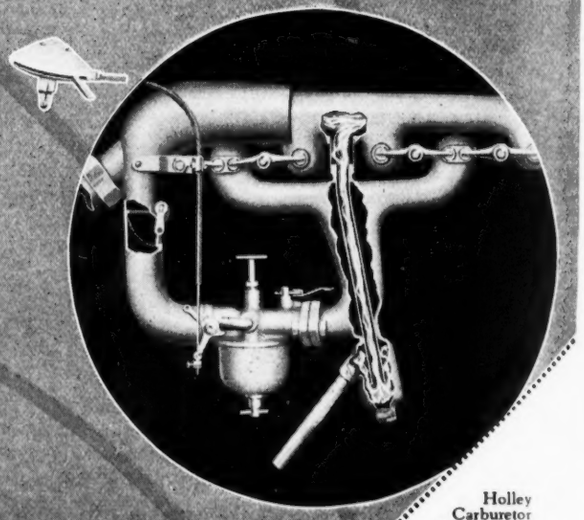
It Paid This Man

Mr. Lutz, Hagerstown, Md. did this, and the first day his profits from the sales of the Holley Hot Shot were $23.60. He will make a nice profit this month.

Is Your Territory Open?

Mail the coupon and if your territory is open we will give you an attractive proposition.

Holley Carburetor Company
Detroit, Michigan



HOLLEY HOT SHOT

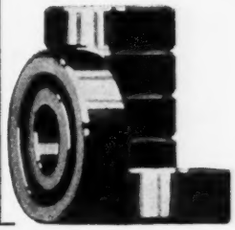
Holley Carburetor Company, Detroit, Mich.

Let us have complete information regarding your dealer franchise for handling the Holley Hot Shot for Ford cars.

*Name*_____

*Business*_____

*City*_____ *State*_____



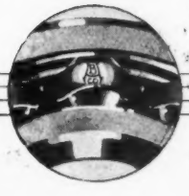
BEARINGS FOR EVERY APPLICATION

Ahlberg Ground Bearings give good service under the most severe operating conditions. When you replace ball bearings do it with Ahlberg Ground. *The saving is large.*

Branches in 37 cities

AHLBERG BEARING COMPANY

321 East Twenty-ninth St Chicago



The DUNHAMETER

The Engine Guardian

The Colonial Model
(Front View)
Different colored lens with your initial or car trade mark furnished with this style of Dunhameter.

MECHANICAL PERFECTION

—plus Real Beauty

The above illustration shows the Classic Model when tilted back for filling the radiator. Note the compactness of the attachment—no extra lock is necessary.

DUNHAMETERS *are easily screwed and locked on to any car, and guaranteed to be theft-proof.*

Any device for showing the driver of a car the temperature of his engine is good, but it is of utmost importance that the driver be warned—day or night—the instant that his engine overheats.

After twenty years of successfully manufacturing thermostatic devices the originator of the DUNHAMETER has perfected a device that is not only reliable under all weather conditions for indicating the temperature of the engine, but registers in such a manner that the driver of the car is instantly aware of the condition the minute his engine overheats. While the engine is at a proper driving temperature a green light is visible in the center of the DUNHAMETER. The moment the engine overheats the thermostat expands, forcing a red shutter in front of the green light, making it impossible for the driver not to notice it.

All models of DUNHAMETERS, besides being guaranteed to function at all times, are installed in the same simple manner on any make of car. A single wire (supplied with each DUNHAMETER) is hooked on to the ignition coil. There is absolutely nothing complicated, or anything to get out of order about a DUNHAMETER.

Each model is beautifully designed to harmonize with the appearance of a car. All DUNHAMETERS are of the same reliable construction mechanically, but various models allow the motorist to satisfy his own taste and likewise determine the cost. DUNHAMETERS are built of bronze, finished on the exterior in a beautiful nickel lustre, and guaranteed rust-proof.

Write for circulars describing each DUNHAMETER and its construction, with the name of your nearest distributor. Branch offices in 10 principal cities throughout the United States.

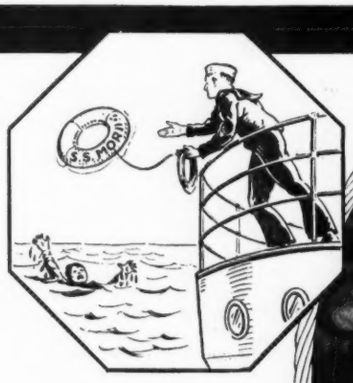
DUNHAMETER CORPORATION

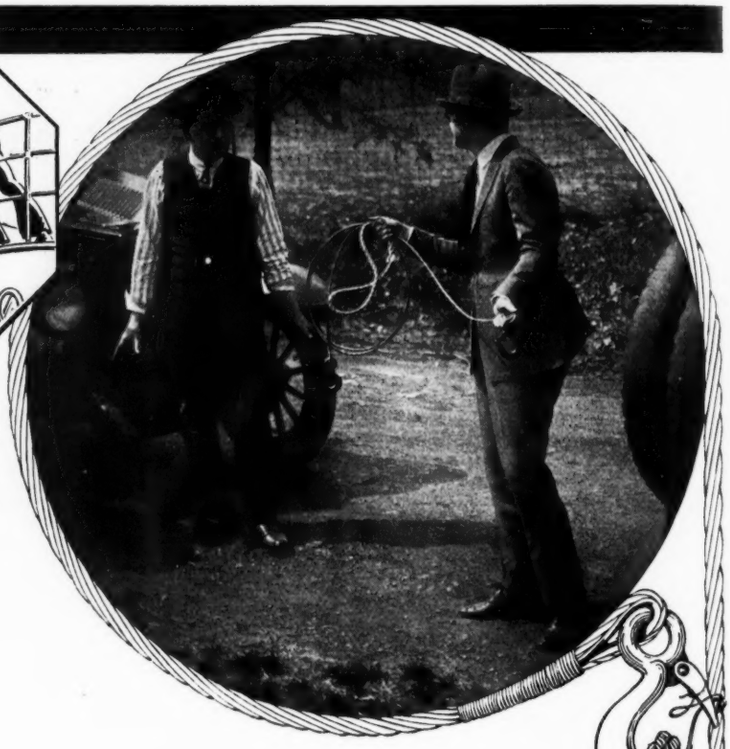
230 East Ohio Street

CHICAGO

Distributors—

If you are in a position to work cooperatively with a proved sales plan and believe that you can productively handle the sale of DUNHAMETERS write us today for particulars, with terms and discounts to distributors. Some of the most desirable territory in the country is still open to live distributors.





"A Life Preserver for Every Motorist!"

That's what thousands of car-owners say of Basline Autowline. And it *is* like a life preserver—not thought about until needed, and then you simply can't get along without it.

No matter what happens—engine trouble, a skid into a ditch, or whatnot—Basline Autowline *is tow-home insurance!* You simply hail the first passing car—hitch on behind—and in a jiffy you're on your way. Get one this week. Don't buy "just a towline." Insist on dependable Basline Autowline—the *original* wire rope towline. Made of world-famous Yellow Strand Wire Rope. Handy, light, coils up flat and fits under your seat cushion. Has patented Snaffle Hooks. And only $4.95, east of the Rockies. Don't put off buying this real necessity—this "Little Steel Rope with the Big Pull."

POWERSTEEL AUTOWLOCK, another Yellow Strand necessity, protects your spare tire. Price $2.50. POWERSTEEL TRUCKLINE is an extra-heavy towline. $8.65 with *plain* hooks; $10.10 with Snaffle Hooks.

JOBBERS AND DEALERS: *Here's Quality, Sales, Profits*

These three accessories have the highest quality and reputation; you know that. Besides, there's a steady demand for them, and they pay you a good profit. This page ad in *Motor Age* is a reproduction of one of our ads in National Consumer Publications. Remember, our accessories are the *only* Nationally-Advertised products of their kind. *And they will make you money!*

BRODERICK & BASCOM ROPE CO., ST. LOUIS—NEW YORK

GR 190

BASLINE AUTOWLINE

The backbone of this campaign is a series of smashing full page advertisements *every two weeks* in the Saturday Evening Post and extensive space in other national mediums. It also includes campaigns in leading farm, motor trade Journals and city newspapers as well as bill boards.

The Largest Advertising Campaign Ever Run on Automotive Equipment

More Motorists Than Ever Will Buy Alemite in 1924. Are You Cashing in on It?

Feature These Products

Alemite High Pressure Lubricating System
Alemite Gas-Co-Lator
Alemite All-Metal Lubricating Spring Covers
Alemite Special Sets for Ford, Chevrolet and Overland
Alemite Lubricant

If you are not now handling all of these products write or wire at once for details of dealer proposition

A Bassick-Alemite Product

THE BASSICK MANUFACTURING COMPANY
2662 N. Crawford Ave., Chicago, Ill.
Canadian Factory: Alemite Products Co. of Canada, Ltd., Belleville, Ontario

ALEMITE

"Reg. U. S. Pat. Off."

High Pressure Lubricating System

Steer Right into Larger Profits

by Selling the

A soft, cushion-like, positive grip for hands or gloves. Warmer in winter — cooler in summer. Covers paint wear and stains. Protects from mechanic's grease. Live, new rubber. Ribbed surface. Made to fit all steering wheels.

Rid-Ged Grip

STEERING WHEEL TIRE

You'll be steering your business right into larger profits the instant you place your order for a quick shipment of "Rid-Ged Grip" Steering Wheel Tires.

The "Rid-Ged Grip" appeals instantly to practically every motorist. Makes steering so much surer and easier. Comfortable to the hands. Sells the year 'round, for it keeps hands warmer in winter and cooler in summer. Gives a *positive* grip to hands or gloves. Greatly enhances the appearance of the wheel.

Order at once from your jobber's salesman. If he cannot supply you, write us direct. Request the attractive, new, colorful 11 x 14-inch counter card and watch it make sales. Our advertising is behind you.

"A Wedford Product Always Sells"

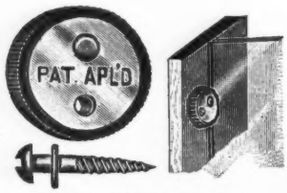
THE WEDLER-SHUFORD COMPANY, ST. LOUIS, MO.

Wedford "EVR-KLEAN" Seat Pads

Protect clothes. Fit any automobile seat. Used in enclosed cars and open. Winter and summer.

Wedford "Air-tites"

The valve cores that "keep tires tight." Don't leak. Fit all standard valve stems. Extra large air intake passage.

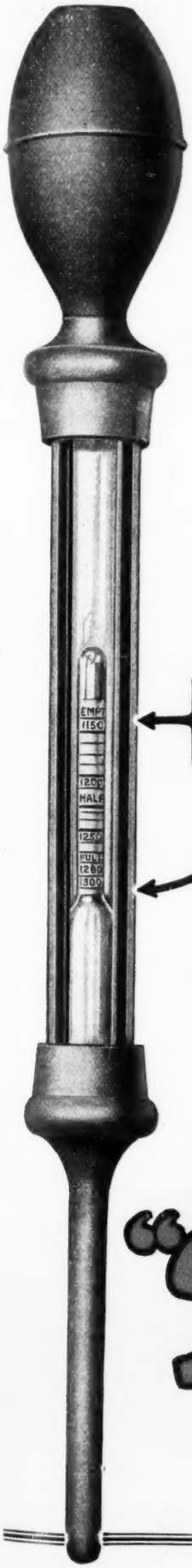


Wedford "Anti-Rattlers"

Prevent rattling and squeaking of enclosed car windows. Also extensively used on house and public building windows.

Wedford

AUTOMOTIVE PRODUCTS



Our New Display Board Does the Selling

Few car-owners think to buy a hydrometer without being reminded. But nearly everyone knows he needs one.

You can't remind all of them. This display does. Better than that, it tells why.

Tested scientifically at both high and low gravity marks, the 2-Point-Test Hydrometer offers more accuracy, hence battery service, for the money.

This display stops 'em, tells 'em, sells 'em. The results show in frequent trips to the cash register.

It Sells for $2.50

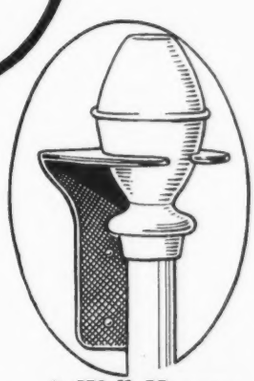
That gives you a better profit on each sale, of course. The fast turnover caused by this display rolls those profits up into a mighty respectable amount—soon. Send for one now. It is free with the first order for ten.

N. & N. HYDROMETER CO.
3715 W. Grand Ave., Chicago

Sales Dept., J. WADSWORTH STAFF
118 N. LaSalle St., Chicago

N&N PRODUCTS

It's Tested at Both Points



A Wall Hanger Is Furnished Free With Every Instrument

"2-Point-Test"

TRADE MARK

HYDROMETER

"Guards Your Battery's Health"

You can place your order intelligently from our two page advertisement in every issue of the Chilton Automobile Directory and the Automobile Trade Directory

Catalogued in Both Directories

How Do You Tell What Kind of Cable to Order?

Suppose Mr. Packard Owner, or Jordan Owner or Stutz Owner requires a new generator-to-battery cable or head light cable, or high tension ignition cable, how, in each case, do you determine the correct cable for that particular part of that car?

Wouldn't it be a convenience and saving of time to simply refer to the Packard Wiring Chart and know instantly just what cable should be ordered for a correct replacement?

The Packard Wiring Chart is used by thousands of automobile dealers to save time and bother—a handy and profitable reference chart furnished free to all dealers.

Use the coupon today. Every dealer needs this chart.

The Packard Electric Company

Warren, Ohio

COUPON

The Packard Electric Co.
Warren, Ohio

Send me the FREE Packard Wiring Chart described in Motor Age.

Name.....

Address.....

City.....

Mail the Coupon TODAY For FREE Copy of the Packard Wiring Chart Shown Above

TRADE MARK REG. U. S. PAT. OFF.

Look for this mark on your drills and reamers. It is your assurance of the highest quality backed by 50 years of experience.

"That's just what this shop has needed"—

exclaimed Jim Bradley, as the boss handed him a complete No. 44 Set of Quick-Set Adjustable Reamers. "Now this shop is in shape to handle any job that blows in—regardless."

"Why all this enthusiasm, Jim?", asked the boss, smilingly. "It seems to me we've always kept you plentifully supplied with first-class reamers. Are these Quick-Sets any better?"

"I'll tell the bloomin' world they are", shot back Jim like a flash. "Why, boss, these Quick-Sets have anything I've ever seen stuck at the post and gaspin' for breath. Here we have an expansion range from 15/32" to 1½"—all in just 11 reamers! You know as well as I do that we've had as many as 20 or 30 reamers lying around here and I'll bet the whole lot of 'em can't give us that range."

"There's another thing, too, boss, that makes these Quick-Sets look good to me. See these blades? When they wear out all I have to do is loosen these nuts, slip in a new set, tighten 'em up to size—and go to work! A lot of these reamers around here have to go back to the factory for new blades—think of it, a factory job and a lot of lost time against this easy Quick-Set way!"

"Yes, sir, give me a Quick-Set every time."

Quick-Set Adjustable Reamers are furnished in 11 sizes from A to K. They can be purchased singly or in handsomely boxed Sets. The illustration above shows Set No. 44 containing all 11 sizes. Other sets are—No. 40 with sizes C to K (9 Reamers); No. 41 with sizes E to I (5 Reamers); No. 42 with sizes C to H (6 Reamers); and No. 45 (new) with sizes A to H (8 Reamers).

If your dealer cannot supply your requirements, write us direct for folder No. 601 and prices.

The CLEVELAND TWIST DRILL COMPANY CLEVELAND NEW YORK-CHICAGO-LONDON

TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

Hycoe

BRAKE LINING

Folded and Stitched
Hydraulic Compressed

MILLIONS OF FEET ANNUALLY

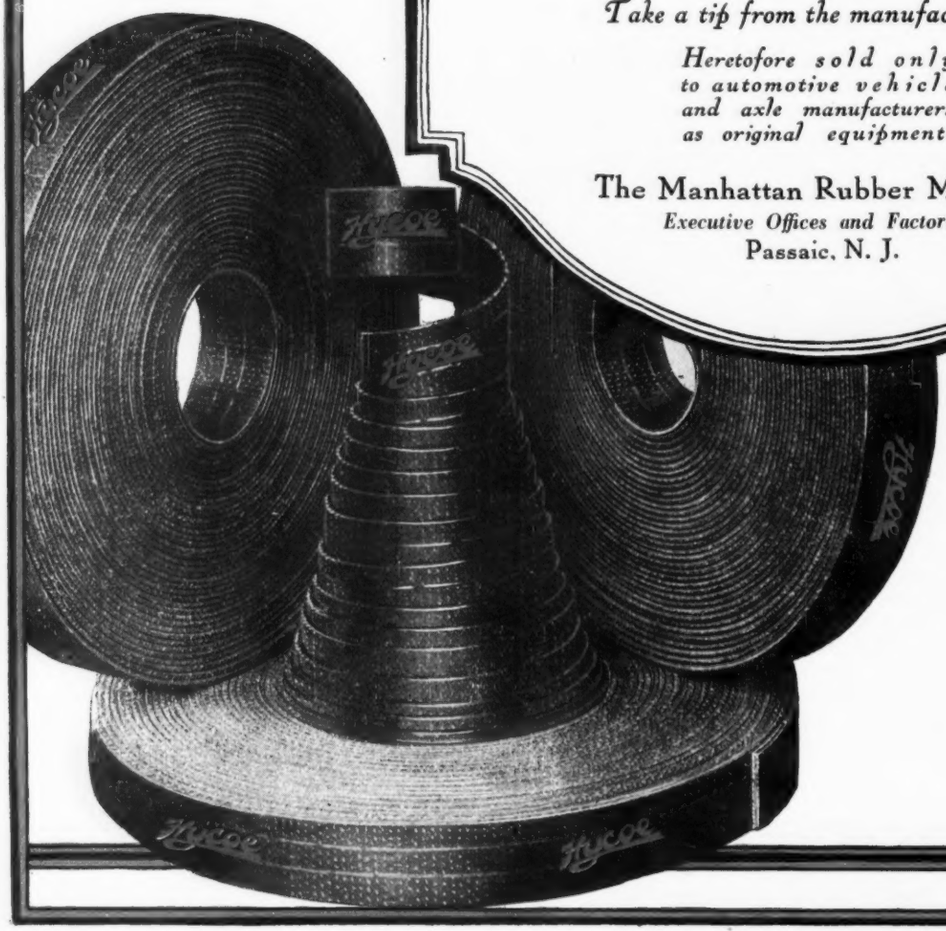
MILLIONS of feet of Hycoe Brake Lining have been installed as original equipment on automotive vehicles this year. Millions of feet more will be installed the coming year. There is a stronger demand for Hycoe every day.

Large auto manufacturers, investing hundreds of thousands of dollars in Hycoe Brake Lining, had to be *sold* before they bought. Hycoe is *keeping* them *sold*. It means something to receive the unqualified approval of executives, purchasing agents, testing laboratories, engineers and service managers.

Take a tip from the manufacturers!

Heretofore sold only to automotive vehicle and axle manufacturers as original equipment.

The Manhattan Rubber Mfg. Co.
Executive Offices and Factories
Passaic, N. J.



BRANCH OFFICES

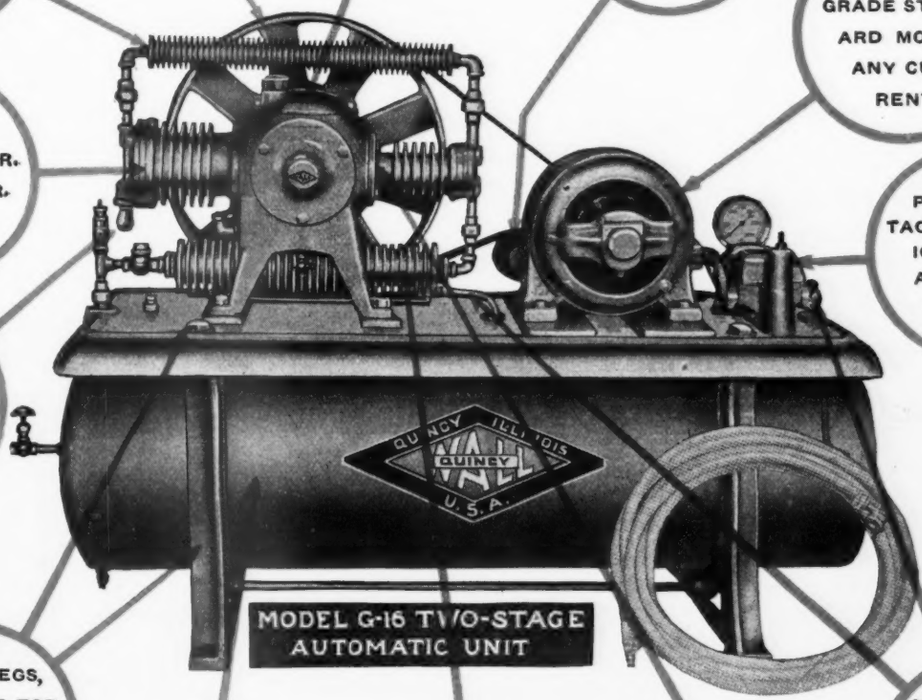
New York
Detroit
Minneapolis
New Orleans
Pittsburgh
St. Louis
Salt Lake City
Chicago
Baltimore
Birmingham
Boston
Columbus
Los Angeles
Tulsa

Now Let's Get Down To Facts

WHY

THE QUINCY SILENT AIR-MASTER

Gives Better Air Service At Lower Cost



MODEL G-16 TWO-STAGE AUTOMATIC UNIT

FAN FLY WHEEL KEEPS COMPRESSOR COOL

EASY ACCESSIBILITY. REMOVE TOP COVER TO INSPECT ALL BEARINGS

ALUMINUM INTER COOLER THROWS OFF THE MOST HEAT

LIGHT WEIGHT SPRING IDLER, GOOD BELT CONTACT

HIGHEST GRADE STANDARD MOTOR ANY CURRENT

PLATE VALVES PUMP FASTER. NO WEAR. LONGEST LIVED

FOUR POINT CONTACT, AUTOMATIC CONTROL. ABSOLUTELY ACCURATE

SILENCER ON INTAKE ASSURING SILENT OPERATION

ONE PIECE LEGS, BOLTED TO TOP PLATE, CARRY ALL WEIGHT

SPECIAL BUILT TANK CARRIES NO WEIGHT. TESTED 400 LBS.

AFTER COOLER TRAPS AND DRAINS CONDENSATION. ASSURES COOL DRY AIR

CYLINDERS BOLTED TO CRANK CASE. EASY TO REMOVE OR REPLACE

AUTOMATIC MOISTURE AND PRESSURE RELEASE VALVE, MOTOR STARTS WITHOUT LOAD

See our exhibit in Space No. 35 at the Chicago Automobile Show, January 26 to February 2.

The Most Air Per Dollar of Cost

A Model to Meet Every Requirement

Write today for Catalog and Price List

WALL PUMP and COMPRESSOR CO.

217 Maine St. Quincy, Ill., U. S. A.

Specialists in Small Air Compressors and Vacuum Pumps

"Twenty minutes
Clark

# of sweet music"

Down in Missouri lives a music dealer who sold nothing but pianos.

One day he called on a friendly competitor and while waiting he was forced to listen for twenty minutes to the r-r-ring of the cash register. Upon interviewing his friend, said this gentleman from Missouri:

"How come you have a cash register? You can't ring up piano sales like that, can you?"

"Oh, no, those are phonograph records, player rolls and sheet music sales paying my overhead."

If you are a car dealer and want to tune in on this cash register music, one of the big items of replacements is the storage battery. The Vesta battery offers particular advantages to the car dealer because of its high quality, reputation and comparatively low price. Its patented feature makes a strong selling appeal and its sturdy qualities make lasting friends in service.

Handling and selling Vesta batteries is easier than you imagine. The investment necessary is small and you will have a money-making department of your business in a short time without straining your resources or your energy.

Our distributors' stock is handy and a representative is waiting to tell you more on request.

VESTA CENTRAL DISTRIBUTORS

Albany Motor Specialty Corp.....Albany, N. Y.	Reinhard Bros. Company....Minneapolis, Minn.
Southern Motor Equipment Co.....Atlanta, Ga.	Walther Battery Service Co...New Orleans, La.
Boice Motor Equipment Co.....Boston, Mass.	P. J. Durham Company.....New York, N. Y.
Vesta Battery Sales Co.....Cleveland, Ohio	Omaha Battery Company.....Omaha, Nebr.
Tennant Brothers.....Dallas, Texas	J. H. McCullough & Son.....Philadelphia, Pa.
Equipment Service Co.....Denver, Colo.	Axwell Equipment Co.....Pittsburgh, Pa.
Auto Electric & Service Corp.....Detroit, Mich.	The Salt Lake Hardware Co.....Salt Lake City, Utah
The Faeth Company.....Kansas City, Mo.	Equipment Service Co.....St. Louis, Mo.
McClelland-Felthouse Co.....Los Angeles, Calif.	

VESTA BATTERY CORPORATION

CHICAGO

No Other Battery Has Them

VESTA

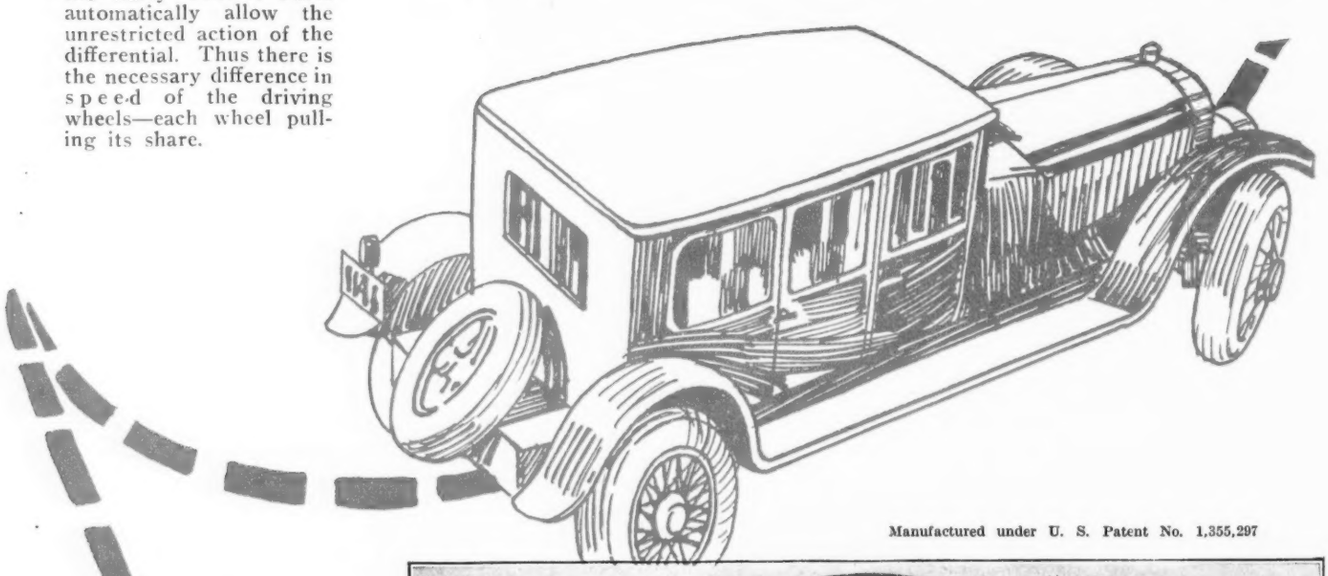
COSTS LESS PER MONTH OF SERVICE

Indestructible Isolators Lock the Plates Apart

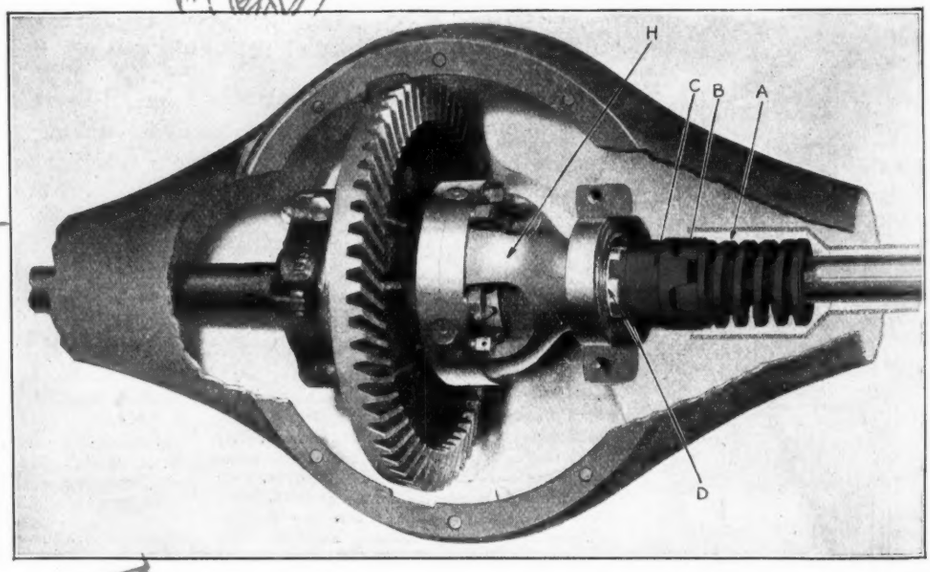
A Vital Rear A

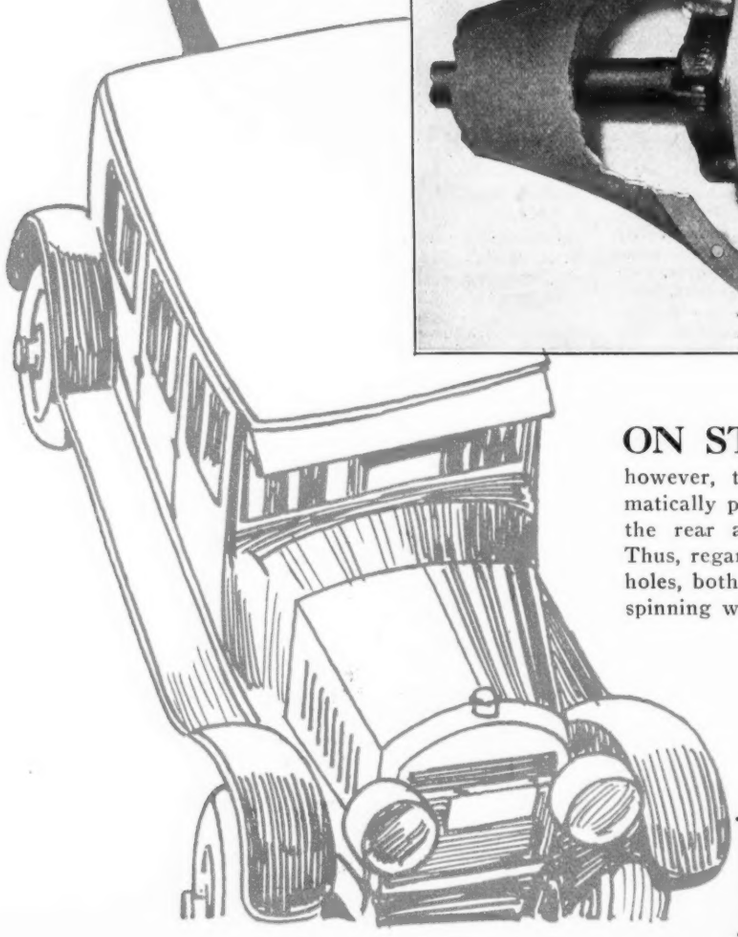
ON CURVES

the Barty Control Parts automatically allow the unrestricted action of the differential. Thus there is the necessary difference in speed of the driving wheels—each wheel pulling its share.



Manufactured under U. S. Patent No. 1,355,297





ON STRAIGHTAWAYS

however, the Barty Control Parts automatically prevent differential action so that the rear axle is in effect a solid axle. Thus, regardless of slippery roads or mudholes, both wheels remain on the job. No spinning wheels—no loss of traction.

BARTY C

rAxle Improvement

The Barty Control Parts make possible a vastly improved axle because they eliminate the one vital weakness of the differential.

They make the conventional rear axle (in effect) a solid axle on straightaways without in the least hindering its differential action on curves.

Thus on straightaways better wheel traction and better brake action are possible while slipping and skidding are almost entirely prevented.

On pavements made slippery by rain or snow and in road mudholes both wheels turning as a unit mean no spinning wheels from lack of traction and no stalling.

The Barty Control is made up of three simple parts which are easily installed and involve only a trifling increase in production cost.

Their action is automatic, soundless, vibrationless and unfailing.

Their adoption means a better car, a more versatile all-season car, a safer car.

Made for both passenger cars and trucks.

May we not demonstrate the amazing efficiency of this rear axle improvement.

Barty Axle Corporation

Syracuse New York

The mechanics of the Barty Control

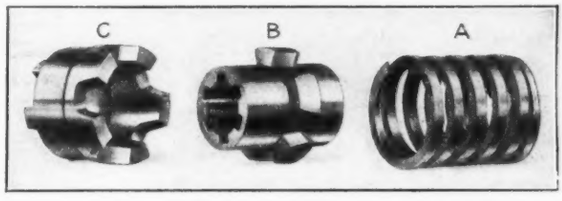
The Barty Control Parts installed on an axle shaft act as a differential semi-lock.

This differential control consists of a jaw clutch with V-shaped teeth, which are normally held in engagement by a coil spring. Thus while the car is being driven over a straight course, the rear axle is virtually solid and the car will not lose its traction even if one of the wheels gets on slippery ground.

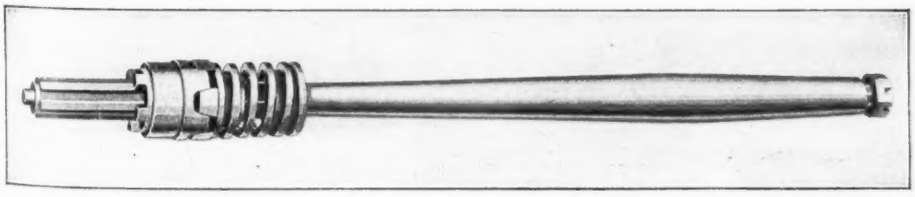
The angles of the clutch teeth are so proportioned that the clutch will not open until the torque on the parts becomes equal to one-half that required to slip a wheel on dry pavement.

Turning a corner the torque instantly reaches that value and the clutch releases, allowing normal differential action.

The action of the Barty Control Parts is silent, smooth and vibrationless.



Barty Control Parts and Working Clutch Teeth



Relative Size of Wheel Shaft and Barty Control Parts

CONTROL PARTS

Overlapping and Interlocking

prevents leakage at the joint

LOOK at the interlocking and overlapping slot of an Everyday Piston Ring and you'll see at once why joint leakage can't take place. When the ring expands to take up the wear, the joint remains securely locked. Oil and gas and power can't get through. This prevents carbonizing and fouled plugs and insures maximum power.

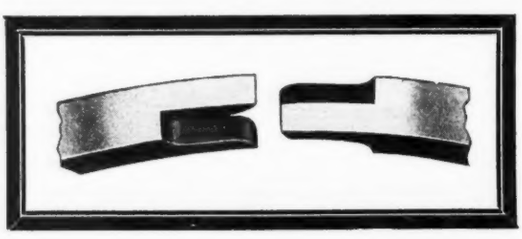
Everyday Rings seat quickly. Their velvet smooth face is a product of accurate lathe work. All standard sizes and oversizes .005, .010, .015, .020, .025, .030 in stock by leading jobbers.

Write for our Extra Profits plan—that shows how to make bigger ring profits. Dealer-Helps to increase your sales.

ROYAL PISTON RING COMPANY, INC.
Bath, New York

Sole Manufacturers of Everyday and Perfect Ever Step Piston Rings.

EVERYDAY
PISTON RINGS



Big Profits Quick and Easy with HEMPY-COOPER Rebabbitting Appliances

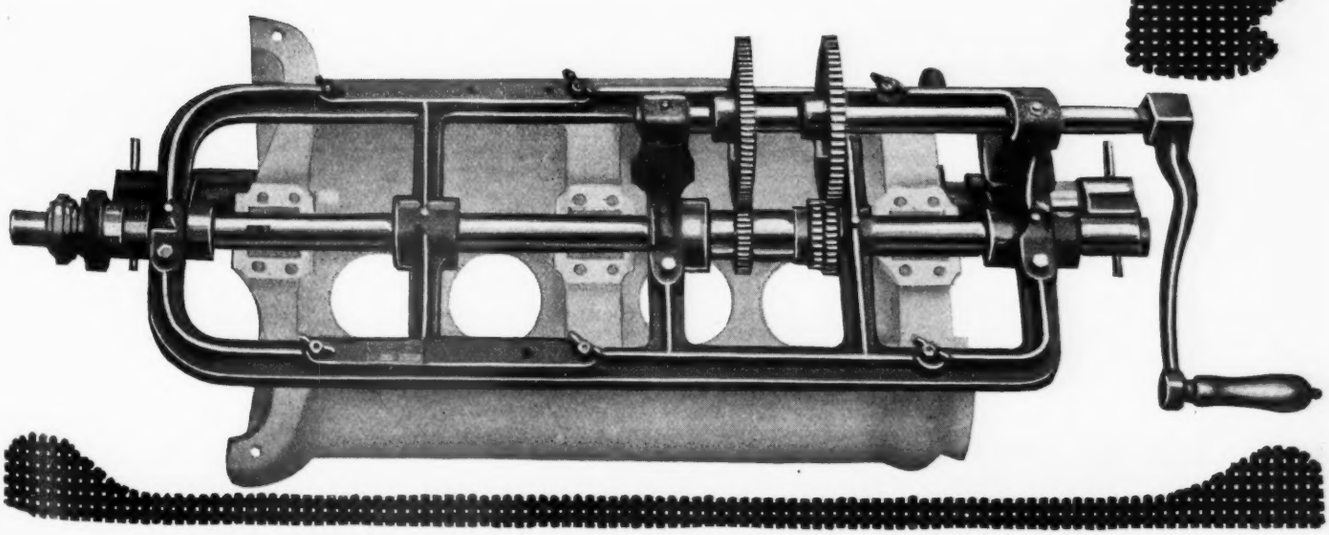
Here's equipment that means BIG EXTRA PROFITS for every Ford and Fordson repair shop or service station! The Hempy-Cooper Machine with one continuous operation in straight alignment bores all three main bearings in Ford and Fordson cylinder blocks. Adjustable to worn crankshafts. This boring operation is done with absolute accuracy in less than 30 seconds with an electric drill and requires but little more time by hand.

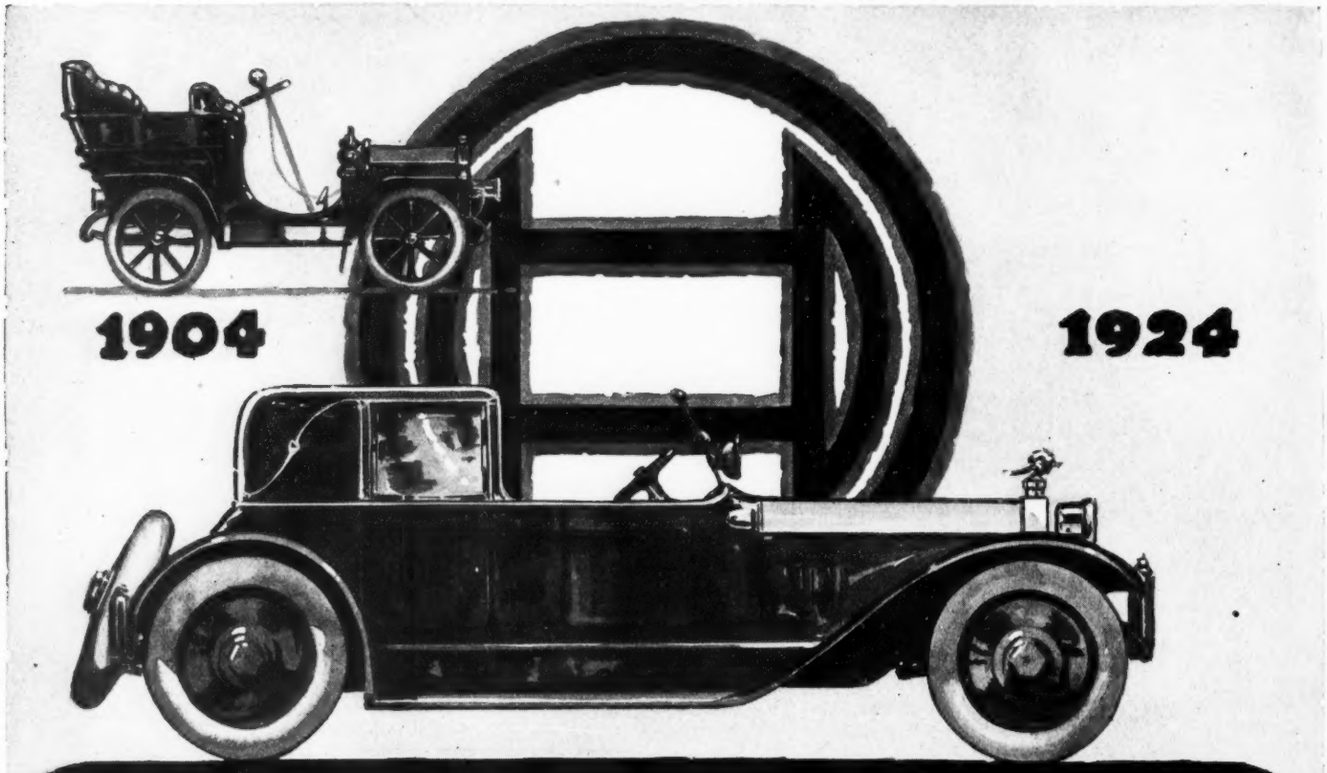
We also manufacture the most improved type of connecting rod jigs for replacing babbitt bearings in rods of all makes of cars using cast-in bearings and a machine to accurately bore all these bearings. These jigs are obtainable for Buicks, Durants, Chevrolets, Stars, Fords and Fordsons and Studebakers.

Investigate! Double your shop profits—save time and labor! 65 leading shop equipment jobbers can supply you with Hempy-Cooper Boring and Rebabbitting Appliances. Ask your jobber for full particulars, prices, etc. If he cannot supply you, write us direct.

HEMPY-COOPER MFG. CO.

412 Archibald Ave., Kansas City, Mo.





Robert Bosch Automotive Accessories

Standard for more than a generation!

The World's Finest Magneto
Waterproof—Everlastingly
Dependable

The Robert Bosch Horn
To Hear It, Is To Want It.

Robert Bosch "Long Life"
Spark Plugs
Valve Seat Principle. Steatite
Core, Perfect Insulation.
Easily taken apart, as shown,
for cleaning.

LIVE Distributors and Service Stations in all parts of the world have created a substantial volume of business with the Genuine, *Original* Bosch Products, year after year, *the United States* 1923 *volume of sales being* 300% *more than during* 1922.

The Robert Bosch inventive genius, knowledge of the motorist's requirements, facilities and equipment, merchandising and advertising cooperation have proved powerful assets in expanding the Dealer's sales in every community in every State in this country.

This year, make it a special point to become identified with the sale of Robert Bosch Magnetos, Spark Plugs, Horns and Spot Lights, and so range yourself with the international chain of progressive merchants who are promoting prestige and profits with this reliable line.

Always Look For This Trade Mark

Send for full details of our Selling Franchise—also latest descriptive literature —"Bosch Facts" and "Bosch Victories."

Robert Bosch Magneto Co., Inc.

OTTO HEINS, President

123 West 64th Street **New York**

Chicago Branch: 1302 South Wabash Avenue
Service Stations in Principal Cities the World Over

The Genuine Original Bosch Means Robert Bosch Only

TANKS DEPENDABLE PUMPS

BOWSER ESTABLISHED 1885

You've Got to Have a Pump You'd Better Have the Best!

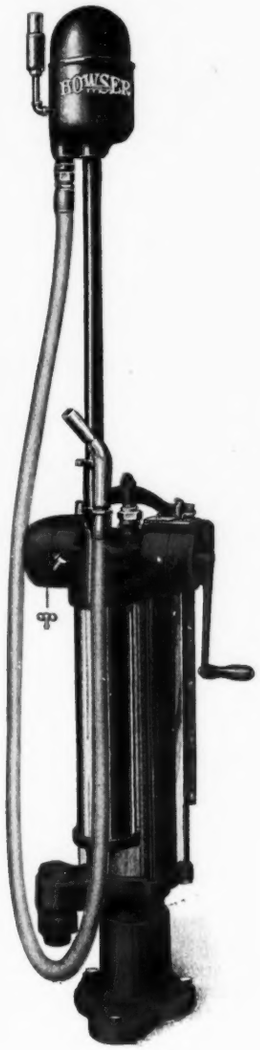


Figure 101 serves gasoline quickly, accurately and easily—free from water and sediment.

Just as you can't show off your cars without good gasoline, just so you want the best pump–

a pump that will take out **all** the water, dirt and moisture;

a pump that is fast and easy to operate;

a pump that's invariably accurate —built of quality parts for long wear and low upkeep—a pump your customers will respect.

The Bowser pump that fulfills all these specifications is shown at the left.

Our engineers have fitted up many dealers' garages with oil storage and service outfits too. Model 59, for instance, is ideal for crankcase refilling—saves labor, time and oil.

Use our engineering division to save you money and increase your shop efficiency. Folder A-14 tells how.

S.F. BOWSER & COMPANY, Inc.

Pump and Tank Headquarters

FORT WAYNE, INDIANA.

Sales and Service Offices and Representatives Everywhere

The Files that cut Production and Repair Costs

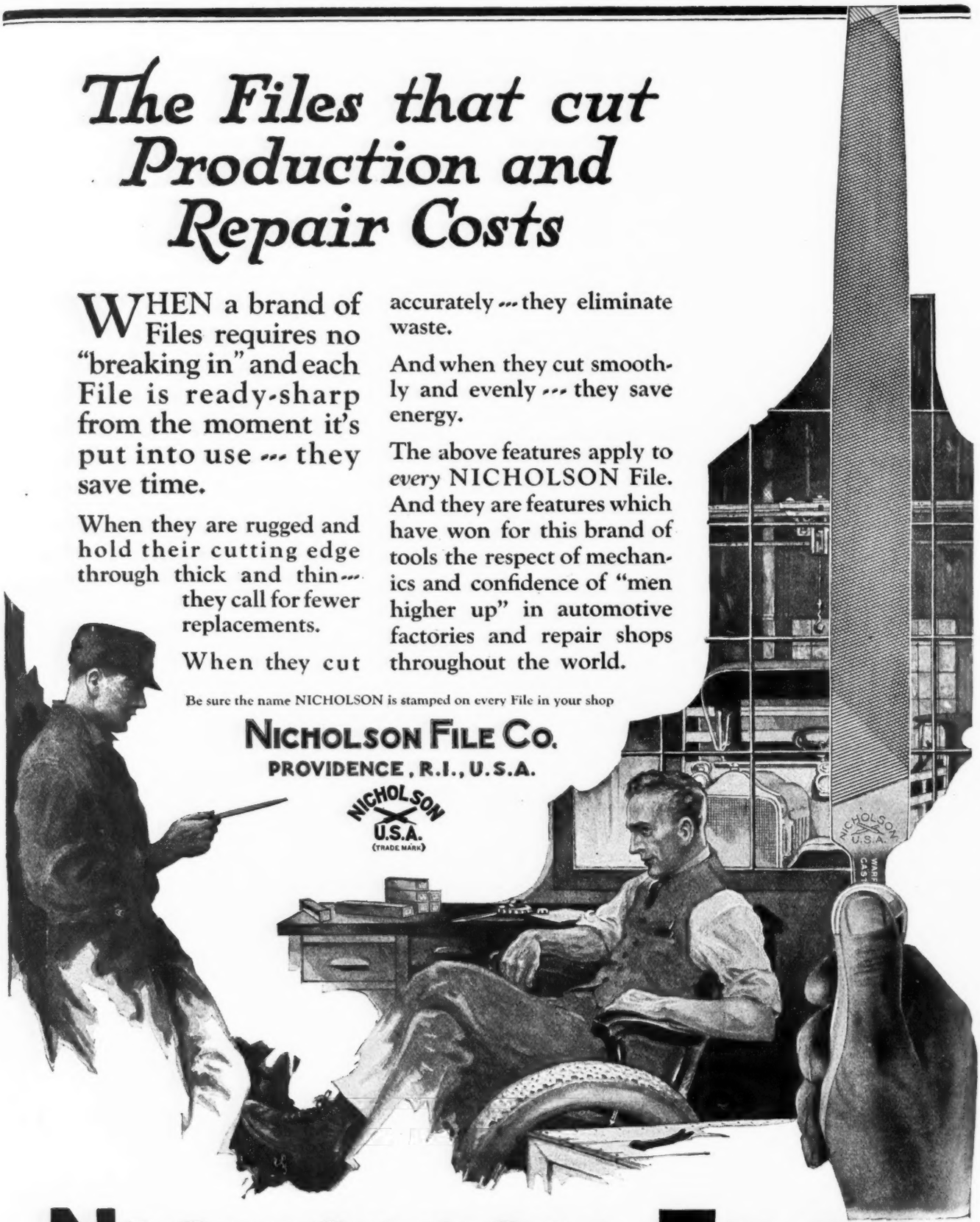
WHEN a brand of Files requires no "breaking in" and each File is ready-sharp from the moment it's put into use --- they save time.

When they are rugged and hold their cutting edge through thick and thin --- they call for fewer replacements.

When they cut accurately --- they eliminate waste.

And when they cut smoothly and evenly --- they save energy.

The above features apply to *every* NICHOLSON File. And they are features which have won for this brand of tools the respect of mechanics and confidence of "men higher up" in automotive factories and repair shops throughout the world.



Be sure the name NICHOLSON is stamped on every File in your shop

NICHOLSON FILE CO.
PROVIDENCE, R.I., U.S.A.

NICHOLSON U.S.A. (TRADE MARK)

NICHOLSON FILES

~a File for Every Purpose!

4 Tons Capacity

One Man

Moderate Price

Any Job

Big Profit

HOLMES WRECKER No. 250

No. 250

A New Holmes Wrecker

For the man who does not specialize in wrecking, but who wants to be ready for any emergency. All the lightness and handiness of No. 110 (formerly Crane Type) and all the adaptability of No. 485 without its greater first cost.

21 to 1 gear ratio and Holmes V tow-bars enable one man to fetch any wreck from anywhere in perfect safety with No. 250. The feet automatically drop to the ground and lock, taking the strain off your service car. See how the road is left clear for traffic. 100 feet of cable give a big working radius without stopping to rehitch on wreck.

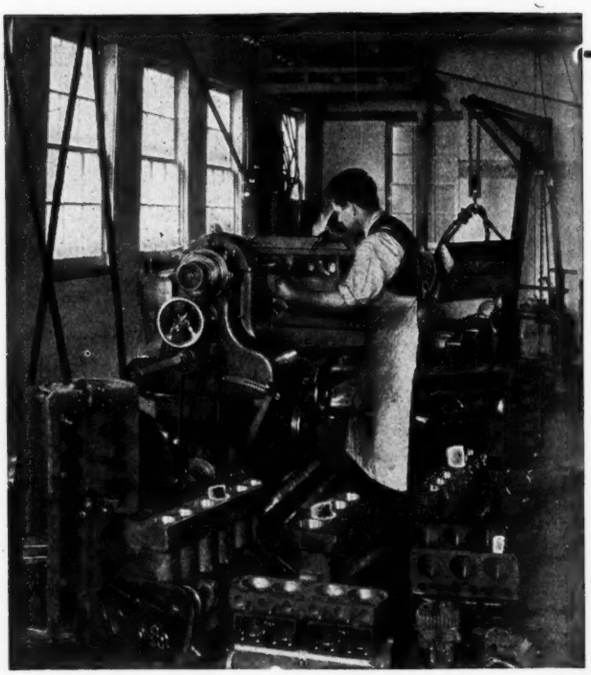
Profits running from $250 *to* $500 *a month are common among owners of Holmes Wreckers. Ask your jobber how to get started.*

Ernest Holmes Co.

Chattanooga, Tenn.

GRIN

The REAL Way to Resize Cylinders



The cylinders of ALL quality cars and many of the medium and low priced cars are invariably ground. All other methods produce a surface subject to very rapid wear. When wear occurs, the cylinders are OVERSIZE, producing "piston slap", which is the very condition to be overcome.

But when cylinders are ground on a grinding machine the result is a glass-smooth STRAIGHT, ACCURATE hole, NOT subject to rapid wear.

Pistons fitted correctly to ground cylinders require little breaking in. They are RIGHT when the job is turned over to the car owner and remain RIGHT longer.

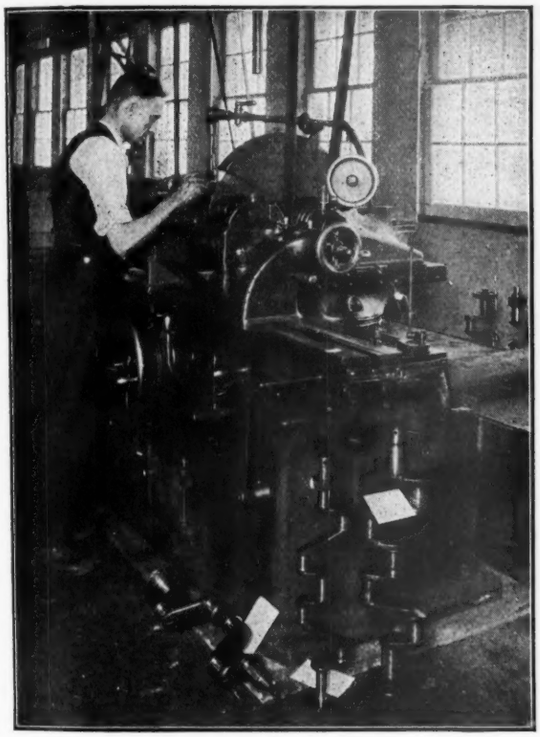
The LANDIS CYLINDER GRINDING MACHINE is especially well suited for resizing work. There is nothing complicated like some machines with their 10 to 12 speeds—the Landis has but 2 traverse speeds, 2 eccentric speeds, 2 spindle speeds. Comes COMPLETE ready to tackle any regular job without the expense of extras.

The Price is a feature.

LANDIS

DING

This Special Machine for Service Stations, Crankshafts, Pistons, Pins, Shafts, etc.



To meet the specialized need of service stations for a grinding machine to resize crankshafts and grind pistons, pins, bolts and similar work, nothing takes the place of the Landis No. 4-A.

This machine should not be confused with a MANUFACTURING Grinding Machine. A MANUFACTURING Grinding Machine is not suitable for the regrinding shop. It costs too much, is too complicated, has too many controls, takes too much time and skill to operate. The LANDIS 4-A SPECIAL was designed especially for use in REGRINDING automotive work.

For regrinding work QUICK CHANGE from job to job, and extreme SIMPLICITY in design and operation are necessary. A crankshaft today, pistons tomorrow, piston pins next day — whatever the job, it is done in true LANDIS fashion in the absolute minimum of time.

We are the largest builders of grinding machines. Due to this, we enjoy large volume, and are in a position to offer distinct PRICE advantages.

Catalogs and quotations gladly furnished.

LANDIS TOOL COMPANY, Waynesboro, Penna.

New York Office—30 Church St.

Quality, Service and Co-operation Mean Much More Than Price

When you can give quick service on any superior quality product and you have real co-operation in your efforts you are not worrying a great deal about your selling price nor what your competitor is selling a **cheaper** article for.

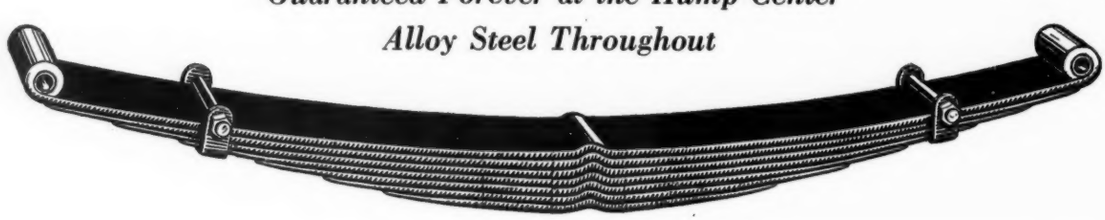
We've proved that and we are proving it right along, or rather, it is being proved for us.

TITANICS are springs of the highest quality obtainable—scientifically oil-tempered alloy steel. The co-operative merchandising plan under which they are sold enables you to give good service without a large investment.

The TITANIC proposition is profitable. Ask us or any distributor how you can make more money more easily selling

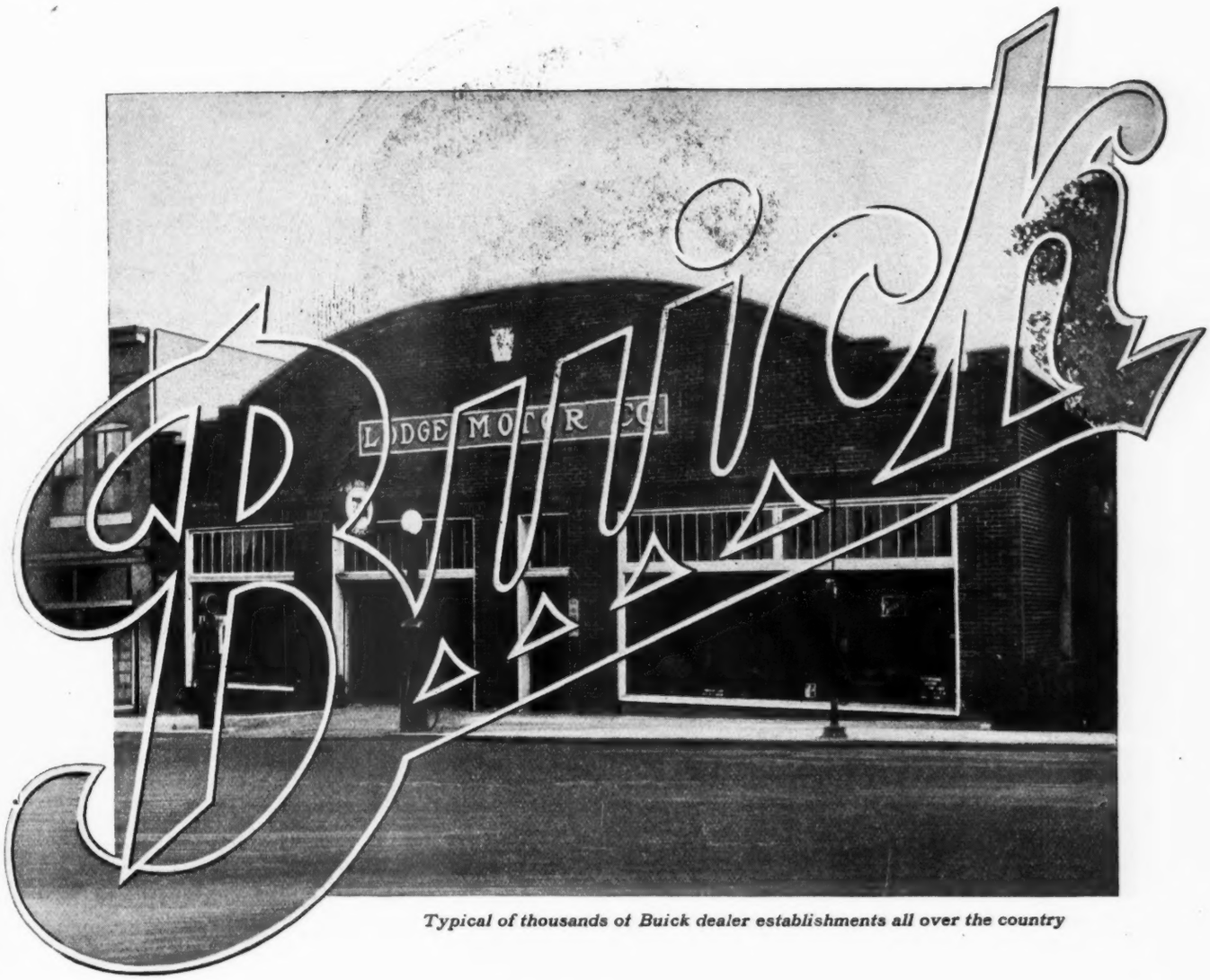
TITANIC SPRINGS

Guaranteed Forever at the Hump Center
Alloy Steel Throughout



Tuthill Spring Company **760 Polk St., Chicago, Ill.**

Builders of Quality Springs for Over Forty-three Years



Typical of thousands of Buick dealer establishments all over the country

Buick Authorized Service Brings Prosperity

The complete service equipment maintained by Buick dealers not only brings them service business for all types of cars, but stimulates the sale of Buicks in their locality. Business is always good with Buick dealers. Why not have your name on file?

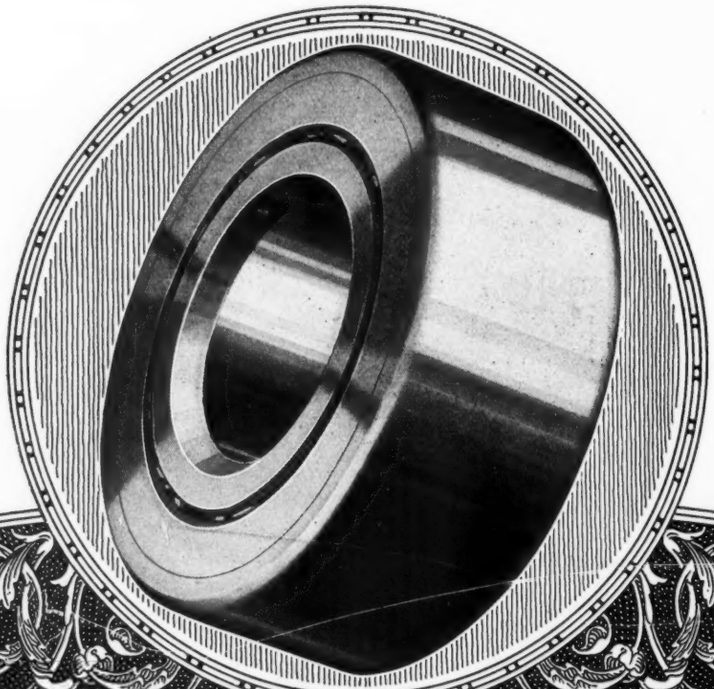
BUICK MOTOR COMPANY, FLINT, MICHIGAN

Division of General Motors Corporation

Pioneer Builders of Valve-in-Head Motor Cars

Branches in All Principal Cities—Dealers Everywhere

WHEN BETTER AUTOMOBILES ARE BUILT, BUICK WILL BUILD THEM



New Departure Ball Bearings

Guaranteeing Crankshaft Bearings Against Wear for Life!

And New Departures Make This Claim Valid

IN any existing passenger car engines that guarantee would be suicidal to its maker. Yet the New Departure ball bearings supporting the crankshaft of 2 and 3 plow tractors—the same type which was driven by the late President Harding on his last trip through the West—are actually guaranteed against breaking, wearing out or burning out by its makers for the life of the tractor.

Is it too much to predict this installation in many American motor cars of the future when tractors, trucks, motorcycles and foreign-made light cars are already using ball bearing crankshafts successfully?

AMONG the many advantages of New Departure ball bearings over plain bearings in this location are:

The least possible friction, hence unappreciable wear during vehicle life; lubrication problem solved, because any sudden failure of the oiling system would not cause burn-outs, as often occurs with plain bearings; no bearing knocks, because ball bearings do not wear loose; no periodical overhauling; no scraping and fitting of bearings; power as well as gasoline consumption saved; infinitely greater engine economy and efficiency through lessening internal friction losses.

THE NEW DEPARTURE MANUFACTURING COMPANY
Briston, Conn.

Chicago Detroit

Distributed by the direct Branches and Authorized Distributors of United Motors Service, Inc., in every town of fair size in the U. S. A. and Canada

The Enquirer Carries,
Year After Year, More
Passenger-Car Advertising
Than All the Other
Cincinnati Papers Combined!

'Way Out in the Lead!

THE ENQUIRER
571,004 LINES

Second Paper - - - - - -	262,062 Lines
Third Paper - - - - - -	130,074 Lines
Fourth Paper - - - - - -	99,204 Lines

(For 11 Months in 1923—New Car Display Lineage)

Many motor car advertisers rely upon The Enquirer exclusively to broadcast their messages throughout the Cincinnati market. EVERY automobile dealer in Cincinnati uses The Enquirer.

The Enquirer alone will carry the burden for you in Cincinnati. For fifteen years it has led in motor-car advertising. There's a real reason for that—results, of course.

1924 SHOW SECTION
FEBRUARY 10th

THE CINCINNATI ENQUIRER

ONE OF THE WORLD'S GREATEST NEWSPAPERS

BOB BEISER, Automobile Editor

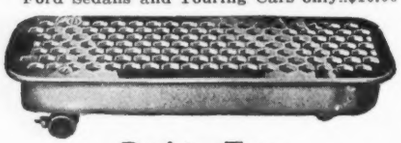
Either Model Fits 90% of all cars

Heelboard Model
(Black Enamel)
PRICES

Utility Type "O" Heelboard Heater 24½" long x 3" wide. Black enamel finish. For front or back of driver's seat in Sedans, Limousines, and Touring Cars $15.00

Utility Type "P" Heelboard Heater, 16" long x 3" wide. Black enamel finish. For front of back seats in Coupes....$12.50

Utility Type "PF" Heelboard Heater, 16" long x 3" wide. Black enamel finish. For Ford Sedans and Touring Cars only..$10.00

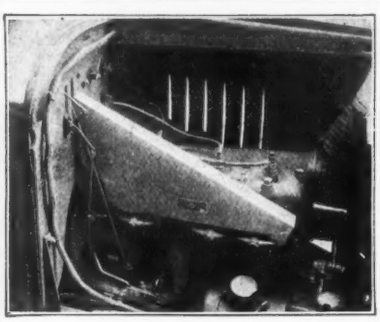


Register Type
(Polished Aluminum)
PRICES

Utility Type "B" Register Heater, 17⅝" long x 6¾" wide. Polished aluminum finish. For Limousines, Sedans, Touring Cars and Taxis $20.00

Utility Type "C" Register Heater, 13⅞" long x 6¾" wide. Polished aluminum finish. For Coupes.....$18.50

Utility Type "CF" Register Heater, 13⅞" long x 6¾" wide. Black enamel finish. For Ford Sedans only.....$15.00



UTILITY
Manifold Heater for Fords

The price is low, yet quality is high. Made of one piece, heavy gauge, cold rolled steel, formed and electrically welded. Entirely nickel plated, strikingly handsome. Prevents odors common to enameled heaters.

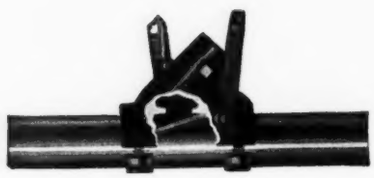
Installation is simple and easy and can be done without removing any part of the car or cutting the floor board, carpet or rubber mat—the opening is already cut in the dash beside the coil box. Floor boards can thus be removed without removing heater. The shutter is placed very conveniently at the side of the coil box and can be operated with the hand or foot.

Installed in a few minutes while your customer waits.

Order a dozen from your jobber today.

$1.75

West of Rockies $1.90



The Universal Valve Makes It Possible

One of the biggest obstacles in the heater business from the dealer's standpoint has been the large number of valves that had to be stocked for fitting all cars. We have removed that obstacle. The dealer who sells Utility Universal Heaters stocks ONE SIZE ONLY and is able to fit 90% of all cars, except Fords, by using the patented steel shims furnished with each valve.

Incidentally, the design of this new valve eliminates all chance of back pressure or leaking. The gradual slope of the flap and tight fittings throughout the entire valve produce an efficiency never before equalled.

Utility Heaters have been regarded throughout the trade as leaders for years. Each year something new and better has been expected in Utility Heaters. Each year something new and better has been found. The two types most popular with car owners are being built this year. They are easily controlled—sanitary—easily cleaned—no operating expense—guaranteed. Your jobber will supply you.

THE HILL PUMP VALVE CO.

4601-4627 Belmont Ave. **Chicago**

Sales Representatives:

S. T. Jessop & Co., 1421 S. Michigan Ave., Chicago, Ill.

Lee H. Craig & Co., 75 Fremont St., San Francisco, Calif.

Mr. Martin A. Dewey, Jr., 17 W. 60th St., New York, N. Y.

E. F. Ware Co., 405 Slaughter Bldg., Dallas, Tex.

Manufacturers' Canadian Service, Ltd., 10 St. Sophie Lane, Montreal, Quebec

UTILITY *Universal* HEATERS

Plus

A Plus Proposition for Plus Dealers

Oakland + General Motors

Ever figure out what this Combination offers to Plus Dealers?

SUCCESS in selling motor cars is a plus proposition all the way.

It takes teamwork to win games, and it takes teamwork to win sales.

It's a live, progressive dealer, plus a strong, far-seeing builder, plus a worthy car, that spells real success these days.

We don't need to tell you that the 1924 True Blue Oakland is a worthy car. Its appearance, its advanced design, its great record prove that.

But we do want to get over to you, quickly, certain other facts you should know.

If you are deeply concerned about your future success—if you want to be insured against uncertainties and possible failures over which you will have little or no control, consider with us for a few moments the plus proposition which Oakland and General Motors offer you.

If you are a plus dealer—one who seeks to excel and therefore deserves to—just follow us through the next two pages. It will be worth your while.

Oakland

PRODUCT OF GENERAL MOTORS

Here is the plus proposition Oakland offers

1. A knowledge and experience gained as the pioneer exclusive builder of Light Sixes. The 1924 shows prove that this type of car is in the greatest favor.

2. Oakland engineers know Light Sixes. They were instructed to make the True Blue Oakland the finest car in its class, and they came through. Oakland proposes to build at all times the most advanced Light Six. Oakland dealers can depend on that.

3. During the past year two million dollars were spent by Oakland in installing the very latest machinery and methods. Only a well financed manufacturer can keep ahead of competition in his facilities and methods and therefore keep his dealers ahead.

4. The True Blue Oakland is the surprise car of the year. No car in its class, announced before or since the True Blue Oakland, has created the interest and actual sales that the Oakland has enjoyed.

5. Oakland realizes that its dealers must sell the cars it builds. And so Oakland's sales policy, advertising program, and selling contract are planned and carried out in such a way as to actively assist Oakland dealers. Oakland's liberal contract and full advertising co-operation with its dealers are two things you should know more about.

And here is the plus proposition General Motors offers through Oakland

1. General Motors, through its financial soundness and announced policies, assures the continued success and progress of Oakland. You will want to be sure this year—more than ever before—that you are tied up with a permanent, far-seeing car builder.

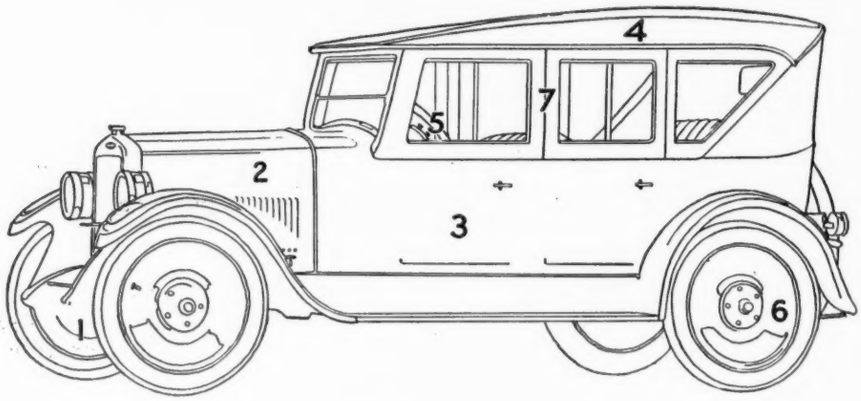
2. General Motors engineers and laboratory facilities are united with Oakland's own engineering department in designing Oakland cars. What better assurance could you ask that Oakland will always build a good car?

3. The General Motors Acceptance Corporation is a very real and practical aid to Oakland dealers. It not only helps to sell more Oakland cars for the dealer, by its liberal plan for financing deferred payments, but it also actually helps him in financing the cars he needs for his showroom or for delivery from stock. It backs up Oakland dealers.

4. Through the tremendous buying power of General Motors, Oakland is able to build and sell a better car for less money—one reason why the True Blue Oakland is so much car at a low price.

+ + + + + + + + + +

Where will you be ten years from today?



Wouldn't you rather sell this car than compete with it?

THESE outstanding and advanced features of the True Blue Oakland explain why Oakland dealers are enjoying a remarkably successful selling season.

1. **Four-Wheel Brakes.**
   Absolutely tried and true. They are here to stay and Oakland dealers point to them with pride.

2. **Brand New L-head Engine.**
   Designed throughout to include the latest and best in design and construction. Full automatic spark control insures power and smooth performance.

3. **New Special Oakland Satin Body Finish.**
   A finish more beautiful when new and one that stays that way. Sun, rain, mud and dust do not affect it. Many cars will have this finish next year.

4. **Permanent Top on Open Cars.**
   More substantial—better looking. Makes side curtains or glass enclosures fit snugly. The days of the old style top are nearly over.

5. **Centralized Controls.**
   Ignition switch, light controls, choke, horn button and hand throttle are on the steering wheel—just where they should be for safety and convenience.

6. **Disc Wheels.**
   Safer—better looking—easier to keep clean. And you get five of them with every True Blue Oakland.

7. **Glass Enclosures.**
   Every buyer of a True Blue open car can quickly transform it to a closed car with Oakland's new glass enclosures. They cost only $60 for touring cars and $40 for roadsters.

These and many other features prove our contention that Oakland dealers sell the most advanced car in its class.

Isn't this plus proposition—Oakland plus General Motors plus the True Blue Oakland plus you—worth considering? There may be an opening in your territory. The signed coupon will bring the complete story.

Oakland Motor Car Company
Pontiac, Michigan
Division of General Motors Corporation

Mail This Coupon Today

Oakland Motor Car Company
Pontiac, Michigan

Please send me the inside facts about the True Blue Oakland and the True Blue Oakland franchise without any obligation on my part.

*Name*_____

*Address*_____

_____

MA 1-24

The *New* Kokomo CRUSADER

A Moderate Priced Cord

The NEW Kokomo Crusader definitely fills the need for a really good cord tire at a moderate price.

Crusader is a big, oversize cord, sturdy in construction. It's a handsome tire—all black with a distinctive tread.

And you can sell Crusader at prices but slightly higher than fabrics!

Write today and let us tell you how Crusader will meet your demand for lower priced cords.

KOKOMO RUBBER CO., KOKOMO, INDIANA

LONG-LIFE KOKOMO TIRES AND TUBES

"Snubs The Rebound"

LIN

A Plan to Make 1924 Your Biggest Year

The Lincoln Department Plan for shock absorber selling has proved its merit. During the past year Lincoln dealers increased their sales over 300%, compared with any previous period of equal length.

The Lincoln plan will bring you two profits on every sale instead of one. It will show you the way to volume shock absorber sales, by rapid turnover of a small stock.

If you are looking for a practical, sensible method of getting more shock absorber business in 1924 than ever before, by all means, mail the coupon provided on the opposite page and get the details of this proven Lincoln selling plan.

For ALL

LINCOLN SHOCK ABSORBERS

Five Big Factors In Lincoln Dealers' Success

1—The Product—the sturdy Lincoln is the *fastest acting* shock absorber on the market. Only three working parts.

2—The Line—Sizes for all cars, making every car-owner a prospect.

3—The Price—So low it is within reach of every car-owner. *$15 to $36 per set of four.*

4—The Plan—of selling Lincolns brings volume sales on a small investment. Lincolns all backed by Saturday Evening Post advertising.

5—The Lincoln Organization—Lends dealers every possible aid to keep sales and profits on the upward swing.

LINCOLN PRODUCTS COMPANY
1251 South Michigan Avenue, Chicago, Ill.
Canadian Factory: Lincoln Products Company, Ltd., Montreal

Did you increase your shock absorber sales 300% last year? Lincoln dealers did. Find out why. Send this convenient coupon for information that will be worth real money to you this year. Do it now and get an early start.

Cars

COUPON

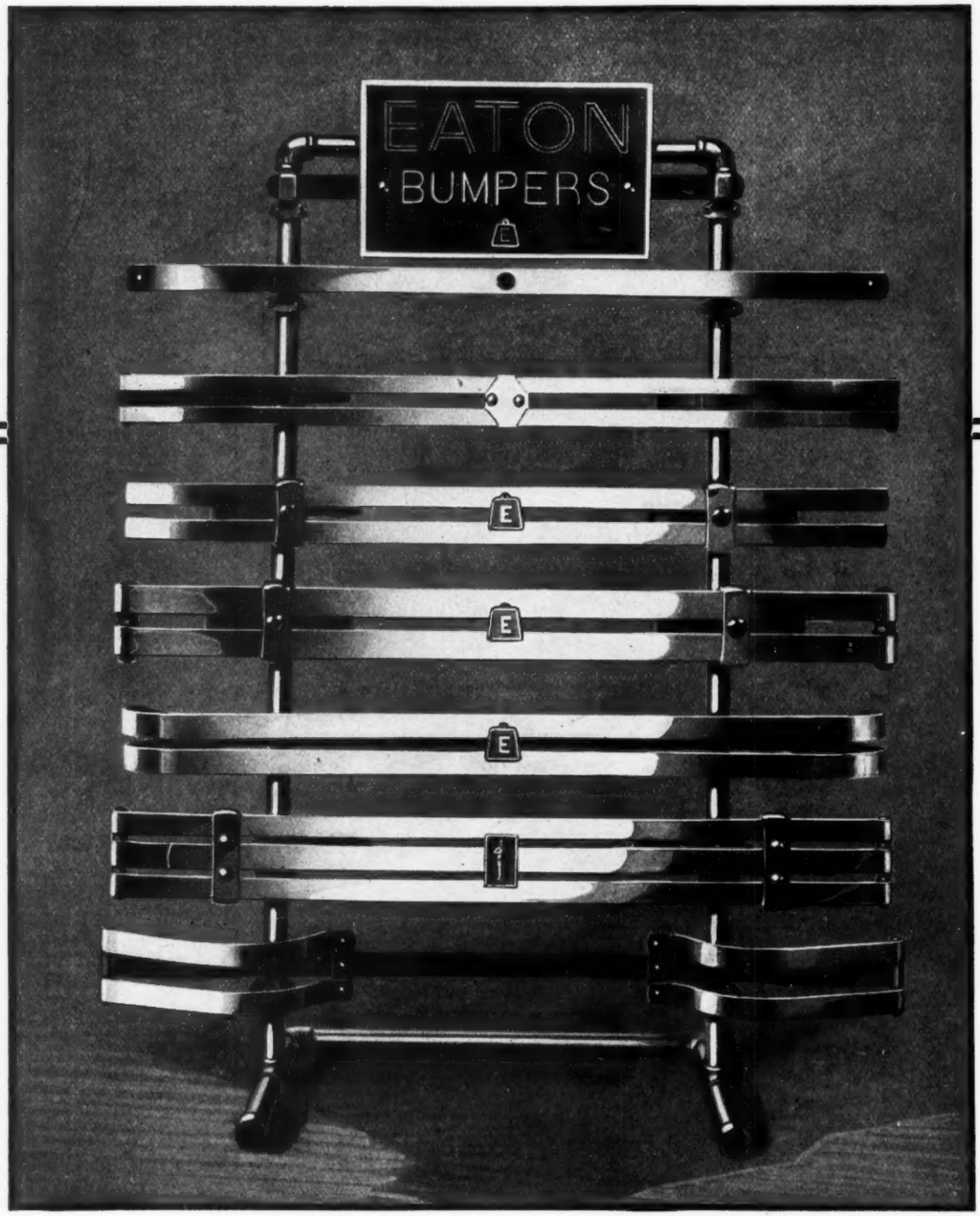
Lincoln Products Company
1251 So. Michigan Avenue, Chicago, Ill.

Please send me the details of the Lincoln Department Plan and show me how I can increase my shock absorber sales this year. This request does not obligate me in any respect.

Name .....

Address .....

City ..... State .....



YOU will find Eaton Bumpers have unusual advantages from a merchandising standpoint. That means styles, prices, fittings—everything that helps to make GOOD SALES. Write us.

UNDERWRITERS' LABORATORIES FOR PASSENGER AUTOMOBILES OF ALL WEIGHTS EATON AXLE & SPRING CO. CLEVELAND PATENTS PROTECTED INSPECTED BUMPER B-4

The EATON AXLE & SPRING COMPANY

CLEVELAND

EATON AXLES *PERFECTION SPRINGS* *EATON BUMPERS*

CHICAGO SHOW EXHIBIT
COLISEUM, SECTIONS 81-82

NEW YORK
1846 Broadway

PHILADELPHIA
223 N. 22nd Street

BOSTON
162 Brookline Ave.

ALBANY
N. Pearl and Van Woert Streets

CHICAGO
2637 S. Michigan Ave.

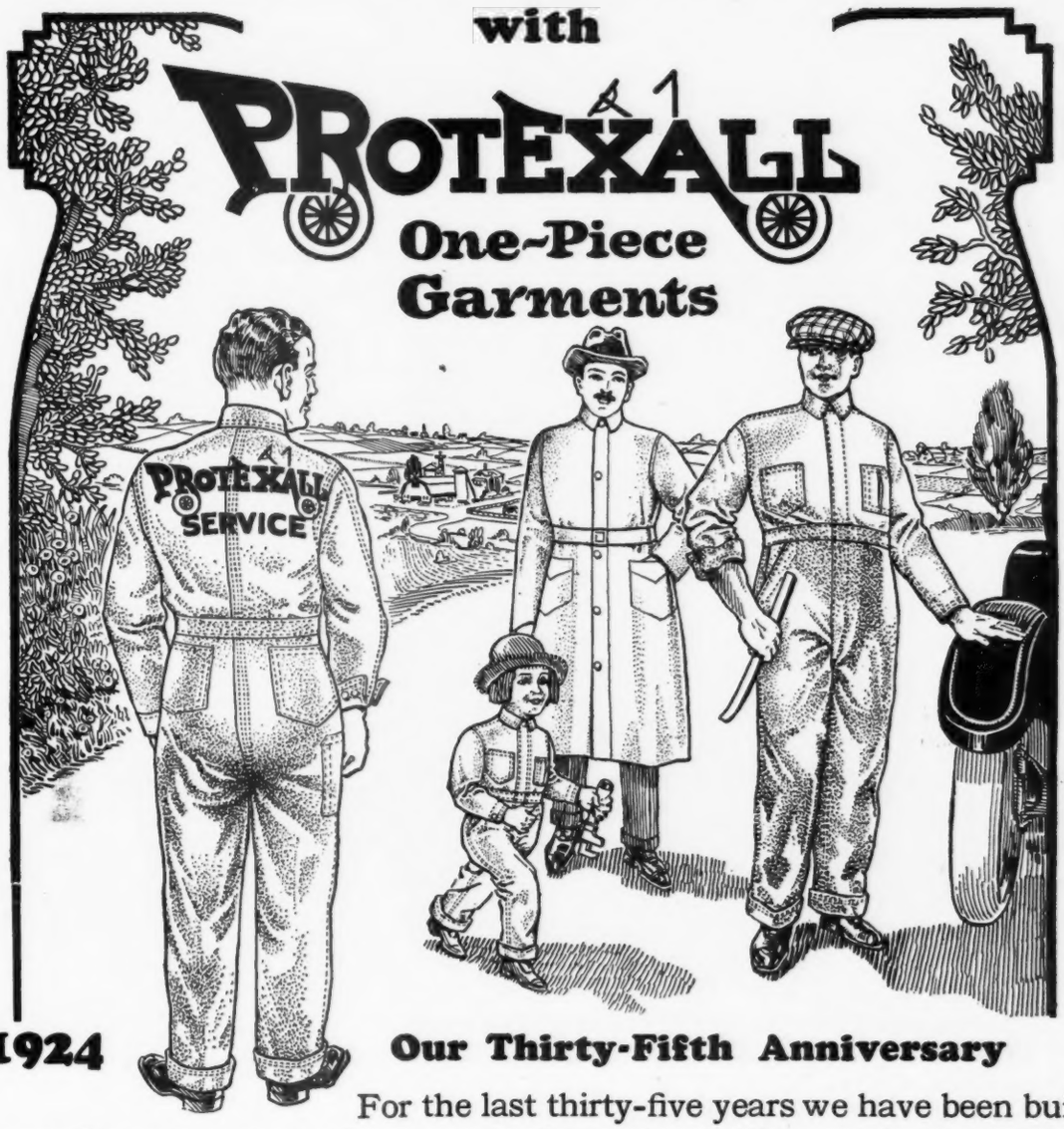
CLEVELAND
6515 Carnegie Ave.

More Profits in 1924

with

PROTEXALL

One-Piece Garments



1924 **Our Thirty-Fifth Anniversary**

For the last thirty-five years we have been building quality garments and our years of experience have made us experts in our line. Protexalls are the best garments that can be built for the price.

Our Line Complete

We offer a complete line of several grades of garments in Blue, Khaki, White and Stripes. The material and workmanship are of the finest. We have a special lettering service that will interest you. Ask your jobber.

Exceptional Service Features

1. SPECIAL LETTERING SERVICE. (Prompt Delivery)
2. DUST-PROOF CARTONS.
3. INDIVIDUAL PACKAGES.
4. DROP SHIPMENTS TO CUSTOMERS.
5. PROMPT DELIVERIES FROM SIX FACTORIES.
6. WESTERN BRANCH FOR STOCK AND LETTERING.
7. HIGHEST FINANCIAL RESPONSIBILITY.

Sold Only Through Jobbers

THE PROTEXALL COMPANY

100 Pearl St., Abingdon, Ill. — Est. 1889

60 Federal Street, San Francisco, Calif.

Making an "easy-seller" easier to sell

SHALER

Self-Merchandiser

is Sent FREE

with a dozen Shaler 5-Minute Vulcanizers ordered from your Jobber

Ask Your Jobber's Salesman

SHALER

Big 1924 Sales Campaign

Shaler sales for 1923 were the largest in the history of our business. We shall therefore increase our national advertising during 1924 to still further increase the demand for Shaler 5-Minute Vulcanizers, and give Shaler dealers more effective co-operation than ever before.

A steady, consistent campaign of advertising will appear during 1924 in The Saturday Evening Post, Popular Science Monthly, and all the leading motorist publications, which are read by motorists throughout the entire United States and Canada. Our advertisements will tell motorists why they should buy a Shaler Vulcanizer. "Tell 'em you sell it" and get the benefit of our national advertising.

C. A. SHALER CO.
205 Fourth Street Waupun, Wis.

Get a Shaler Self-Merchandiser from your jobber—put it in your window or on your counter. Then watch your sales of Shaler 5-Minute Vulcanizers increase.

Remember that after you sell a Shaler 5-Minute Vulcanizer you start a steady chain of sales which bring you in a steady profit on the sale of Shaler Patch-&-Heat Units for use with the vulcanizer, throughout the entire year.

The Shaler is not a seasonable product that sells for only two or three months in the year, but can be sold every month in the year. No other accessory makes such a quick "turn over" or pays dealers as large a profit on their investment as a Shaler Vulcanizer.

Mail Coupon NOW

C. A. SHALER CO. 205 Fourth Street
Waupun, Wisconsin

Send me full information about your FREE Self-Merchandiser.

We have _____ Shaler 5-Minute Vulcanizers in stock.

Name _____

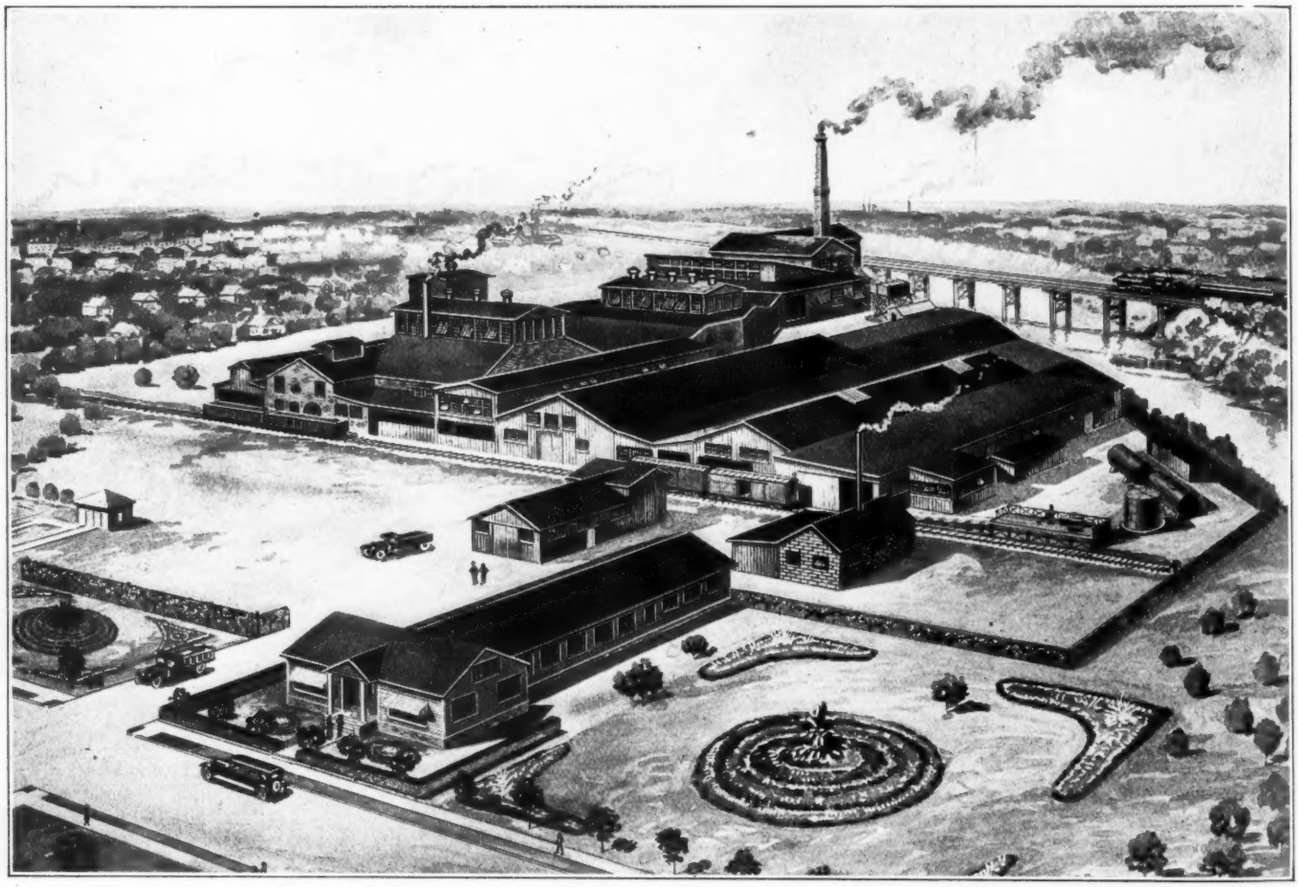
Address _____

City _____ *State* _____

Jobber _____

VULCAN QUALITY

"The Plant"



COMPLETE

Equipment and approved methods of production.

A constant and serious desire to improve the product.

After seventeen years spent in a sincere effort to do well the thing that is ours to do, we are today recognized as the leaders in our industry.

Your judgment is our court of last resort. On every Vulcan Spring, our name plate stands out in bold relief. It is placed there so that you may know the product by the faith we have built into it.

Jenkins Vulcan Spring Co. Factory, Richmond, Ind.

VULCAN QUALITY

"The Service"

Direct Factory Branches at

ATLANTA, GA.
169 Haynes St.

BOSTON, MASS.
171 Massachusetts Ave.

DALLAS, TEX.
2216 Commerce St.

DES MOINES, IA.
5th, Market to Vine

KANSAS CITY, MO.
228 West 4th St.

RICHMOND, VA.
1709 East Cary St.

PORTLAND, ORE.
12th & Glisan St.

SAN FRANCISCO, CAL
1035 Polk St.

SEATTLE, WASH.
1241 Railroad Ave. South

RICHMOND, IND.
Factory 8th & North G

VULCAN

COMPLETE

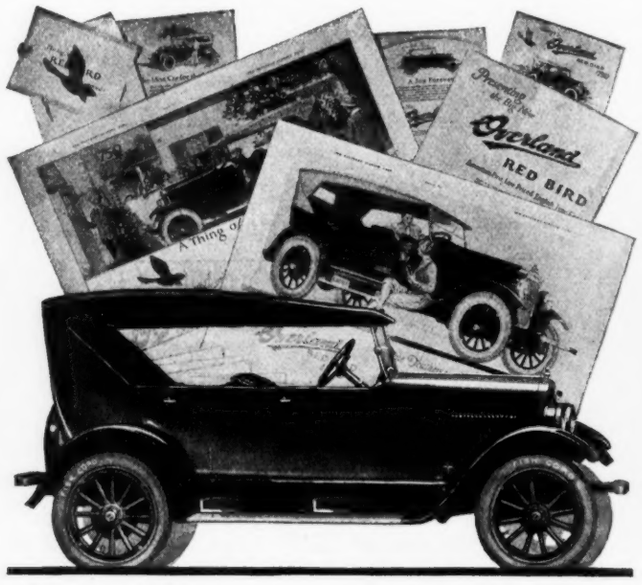
Stocks of Vulcans at all the branches here listed. We strive to serve faithfully with a good product. The Vulcan Exclusive franchise is a valuable asset. It may be open in your territory today. Find out before it is too late.

Jenkins Vulcan Spring Co. Factory, Richmond, Ind.

It's A Happy New Year For

WILLYS-KNIGHT Coupe-Sedan

Since its announcement January 6, a year ago, a continuous success. The first intimate-type closed car with doors front and rear. Marvelous style. The demand grows greater every day.



The Big New Overland RED BIRD

The car that took America off its feet last May. Known immediately from one end of the country to the other. Spring orders indicate an overwhelming 1924 demand.

1923 made Willys-Overland merchants happier and richer than any previous year in their history. You must know by this time that during 1923 Overland and Willys-Knight scored a selling gain that was the outstanding achievement of a big year! *Willys-Overland merchants sold the cars!*

The public bought the cars! And why! Back of advertising and merchandising that astonished the hardened veterans of the industry, was a sincere purpose to present the facts. We sincerely believed that Willys-Knight and Overland offered greater value, more economy, greater dependability, more satisfaction, more power — more of everything per dollar. We turned on the spotlight. One big smashing drive after another into the public mind and eye. They could see! They were convinced! They said so with orders!

The sensational announcement of the tremendously popular Willys-Knight Coupe-Sedan in January. The unhandy, crawling-over-seat car went out and the Coupe-Sedan came in in a blaze of popularity that burns brighter today than ever before. In May, America's first low-priced English-type car, the

WILLYS-

Willys-Overland Merchants

The Latest and Greatest Automobile Sensation
NEW Overland CHAMPION $695
America's Only Versatile Car
The Champion, Money Getter for Dealers!
America's Only Versatile Car
THE NEW CHAMPION
Can you imagine a car like that
Overland CHAMPION $695

Jubilee Week

Last June, a conspicuous Willys-Overland achievement, heralded and celebrated in a fashion that attracted widespread attention to a great organization.

NEW Overland CHAMPION

On October 4th last, the climax to a year of striking accomplishment. The first all-purpose car. The first quality closed-car seating more than two people ever offered under $700! Breaking sales records everywhere!

big Overland Red Bird. As familiar and popular as a dollar bill—overnight. Then before the public got its breath—Jubilee Week. *A Million Willys-Overland Cars.* And to fill the Willys-Overland merchants' cup of success to the brim, and run it over, in October Willys-Overland gave the world the world's most useful car, the Overland Champion. An all-day, seven-day, all-year, all-purpose hit—instantly.

The convincing impression created gathers more momentum as time goes on. Tens of thousands were struck by the merit in Willys-Overland merchandise last year who will *buy* Willys-Overland merchandise this year. Willys-Overland advertising is overwhelming. It gains in intensity and pulling power every year, every month, every week, *every day.*

No wonder Willys-Overland merchants are celebrating a happy and prosperous New Year. Will you be happy on New Year's Day 1925? Get happy! Write or wire for the complete details of the most valuable, most liberal automobile franchise ever written.

WILLYS-OVERLAND, INC., TOLEDO, OHIO
WILLYS-OVERLAND SALES CO. LTD., TORONTO, CANADA

OVERLAND

ZENITH

Four Reasons for Zenith Supremacy

A beam of light, projected on a screen, detects the slightest variation in the weight of floats.

"Chokes" are gauged inside and outside. The smallest variation from standard brings rejection.

Needle valve points are inspected under powerful microscopes, to detect any flaws hidden from the eye.

Seven batteries of these machines calibrate the jets by measuring the exact rate of flow through the opening.

ZENITH CARBURETOR

Ordinary methods of inspection are not sufficiently delicate to insure exact duplication, in production. Special devices, designed and built by us, insure that all controlling parts of a size are really identical; that when these parts are assembled, all Zeniths for a given motor will act exactly alike.

That is why results obtained by Zenith experts in factory tests are duplicated by the car owners in actual service.

ZENITH-DETROIT CORPORATION

Manufacturer of

ZENITH CARBURETORS

DETROIT MICHIGAN

Branches:

NEW YORK · CLEVELAND · CHICAGO

Service Stations in over 800 cities

Here's the New

TEMCO

Half-Inch Garage Drill

Model G-D

Length, 17 in.

Weight, 16 lbs.

Capacity, 0 to ½ in. in steel

Speedy

650 R. P. M. (Idle)

Powerful

—as shown by this record: 70 holes, 1 inch deep, in steel in one hour.

130 holes, 1 inch deep, in steel in two hours—and it didn't run hot!

Economical

The first cost is practically the only cost, because of TEMCO quality.

$56.00—and Look At This Price

THIS new TEMCO Half-Inch Garage Drill is specially designed to meet the needs of the Garage Man for lapping pistons, honing cylinders, installing accessories, grinding valves, and all sorts of drilling, reaming, tapping, etc. Can also be used as a bench or post drill. Is equipped with a powerful TEMCO fan-cooled, ball-bearing motor that doesn't run hot; high grade ball-bearings throughout that eliminate friction; oil hardened gears, and many other special features. Built for the man who must have service at the lowest possible cost—and we stand back of it with the TEMCO guarantee.

The TEMCO Line also includes Bench, Pedestal and Tool Post Grinders. The New TEMCO Half-Inch Garage Drill shown above, can be used in our Bench and Post Drilling Stand which can be furnished for only $26.00 additional.

ASK YOUR JOBBER for complete information about TEMCO Tools, or write us direct, giving name of your Jobber

The Temco Electric Motor Co.

701 Sugar St. Leipsic, Ohio

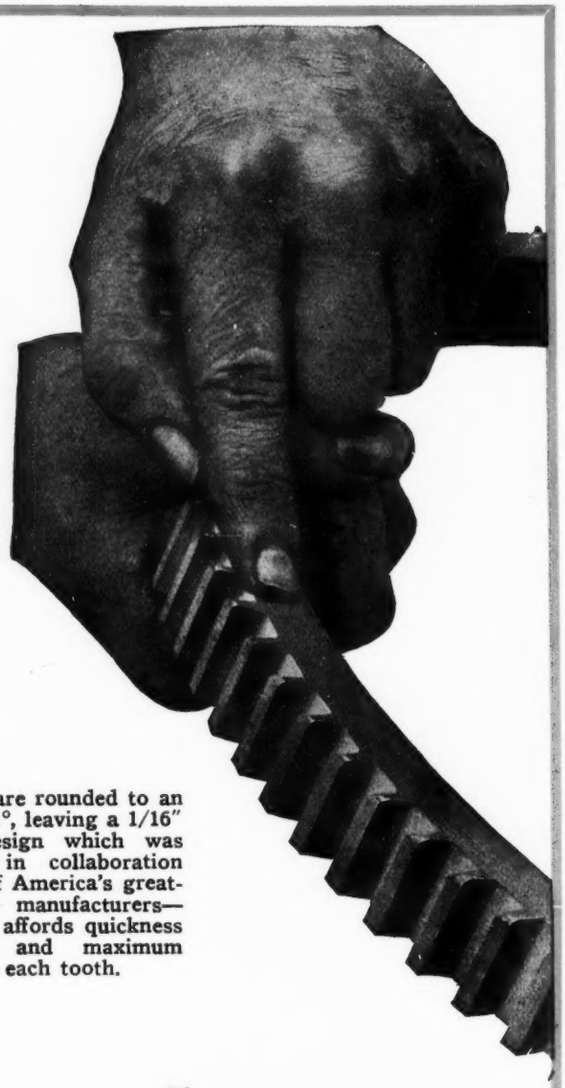
Makers of Electric Tools since 1910

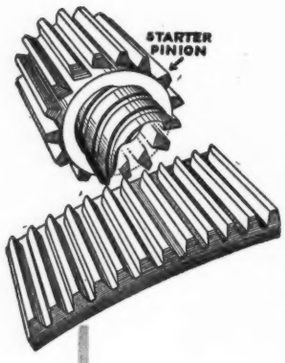
How Lathe-equipped Shops C

"SHRUNK ON" LOGANGEAR

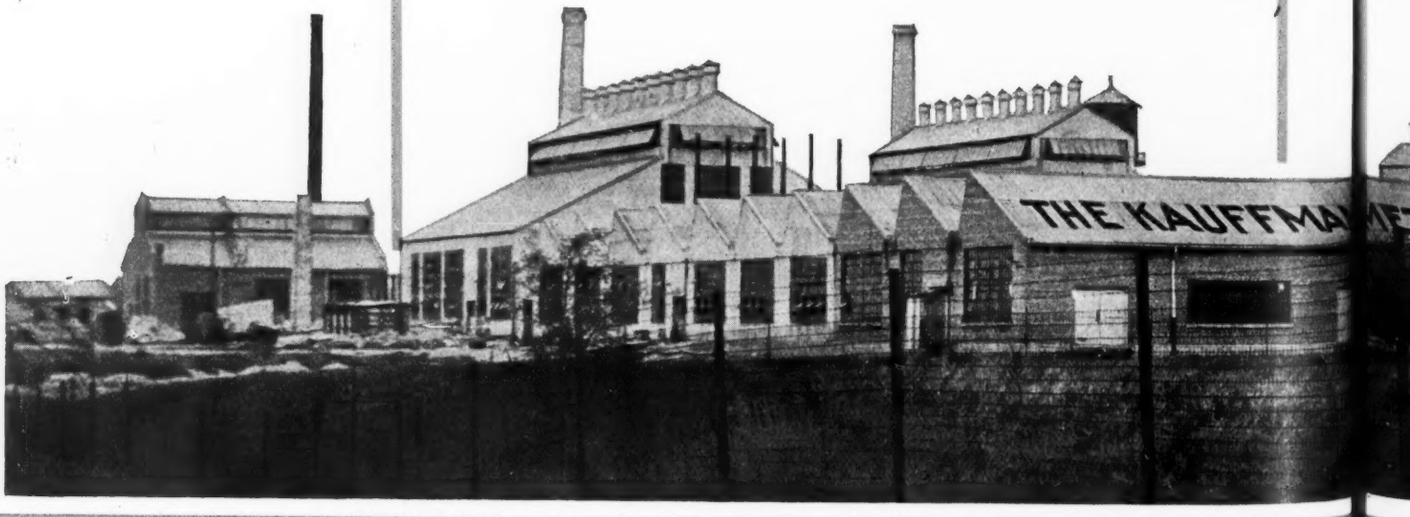
FOR YOUR SOFT IRON OR STEEL HUB FLY WHEEL

The Logangear is made of a bar of special alloy steel, shaped to a ring, heat treated and electrically welded at the joint. The gear teeth are then cut to accurate pitch and given a scientifically correct chamfer which insures a perfect mesh with the starter pinion. The finished ring is then hardened.





The teeth are rounded to an angle of 45°, leaving a 1/16" land—a design which was developed in collaboration with one of America's greatest starter manufacturers—and which affords quickness of mesh and maximum strength in each tooth.



Every Stripped Flywheel Gear is a Busi

Can Add to Their Profits

WE don't claim that installing Logangears is the greatest opportunity the trade has ever seen but we do claim that it offers to the man with a lathe-equipped shop a chance to materially increase his profits and at the same time render a service that rightfully belongs to him.

The big and country-wide demand for Logangears which forced us into our present great plant, proves that other dealers have seen the money making possibilities of this quality service and are cashing in on it.

Instead of sending a battered flywheel away to be repaired or ordering a new one, you install a Logangear, thus taking care of the job in your own shop, fixing the motorist up without delay and—pocketing the whole profit yourself.

The job of installing Logangears is simple: you place flywheel on lathe and turn off old cast iron teeth to diameter stamped on side of ring gear—

Heat steel gear with an ordinary blow torch to blue heat and shrink on in place where cast iron gear is turned off.

The repaired flywheel is then better and stronger than a new one for the carbon steel, heat treated Logangear teeth can never batter nor strip.

Logangears are made for every size and type of flywheel.

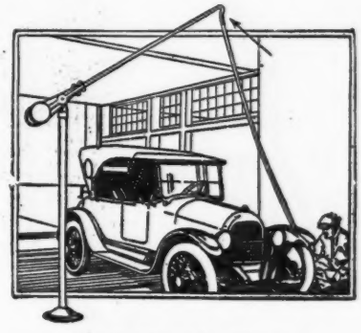
Write for the Logan catalog of gear sizes—join the thousands of dealers who are adding nicely to their profits thru this service.

KAUFFMAN METAL PRODUCTS CO.,
Toledo, Ohio

LOGANGEARS

Axle Nut Assortment

This bag contains an assortment of 50 axle nuts—which are sufficient to fill the replacement needs on over 225 makes and models of cars, trucks and taxicabs. A small investment offering an opportunity for large profits. Assortment can be kept complete through your jobber. Write for price list and chart.



LOGAN Air Tower

A quick, clean, efficient way of serving air to the motorist.
The movable arm can be swung around to all four tires—the motorist can do it himself.
The LOGAN doesn't take much room. It can be placed where it will always be accessible and still be out of the way. It makes your air service impressive.

Business Opportunity for the Logan Dealer

flatlite

THE AMERICAN FLATLITE CO. FLATLITE STANDARD CIN'TI, O.

flatlite
is patented
in 17 foreign
countries and
the United States

A plain glass lens and a *flatlite* reflector

Make a headlamp that is legal in all states and a whirlwind seller.

flatlite

for replacement in

as a complete

Stock *flatlite*— and make money

That's all there is to the *flatlite* proposition. You stock it and the natural demand for *flatlite* plus your selling ability will show a turnover that will surprise you with its money making possibilities.

Unbottle the "bottled up" light in your share of the 13,000,000 headlamps that need *flatlite* reflectors.

Flatlite does everything any special lens does without cutting down the light. Properly focused, the *flatlite* reflector controls and projects all the light through plain, clear glass lenses —obeys the law—satisfies the car owner—makes money for its dealers.

Send in your Coupon TODAY —NOW or wire if the mails don't work fast enough for your speed.

The American Flatlite Co.
1100 Gilbert Ave., Cincinnati, Ohio

flatlite headlamps complete and flatlite reflectors now being produced at the rate of 3,000 per day

Your Coupon

Sign—tear off—mail—TODAY

The American Flatlite Co.,
1100 Gilbert Ave.,
Cincinnati, Ohio

Gentlemen:

Send full particulars of the Flatlite proposition

*Name*_____

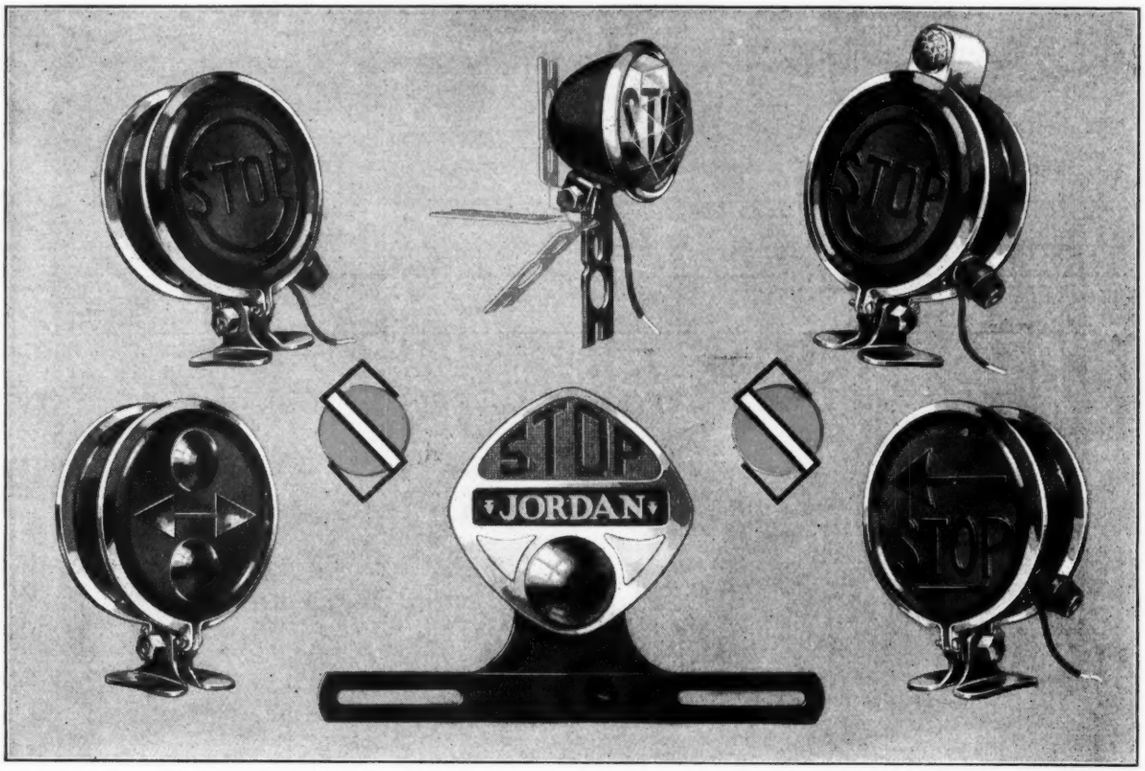
*Address*_____

_____

s sold as a reflector
in present headlamps or
te headlamp

STOVER

Every Car Owner a Prospect



Some Dealer in Every Town is Going to Sell This Nationally Advertised Line

CONSTANT research and experiment has developed Stover quality to the point where any motorist, regardless of the car he owns, can secure a quality Stop Signal at the price he wants to pay—that means every customer that enters your store is a prospect for some Stover Signal.

This makes it easy to sell Stover Signals. You don't have to waste time trying to sell Stover Stop Signals.

All Stover Signals are built to the same high standard of quality. You can show your prospect that the $2.50 Safety Signal has the same high-grade, infallible switch as the $12.50 Stover Arrow-Lite. You get the sale and your customer gets the signal he needs. That means satisfied customers—and profits.

The Stover Signal Engineering Co.

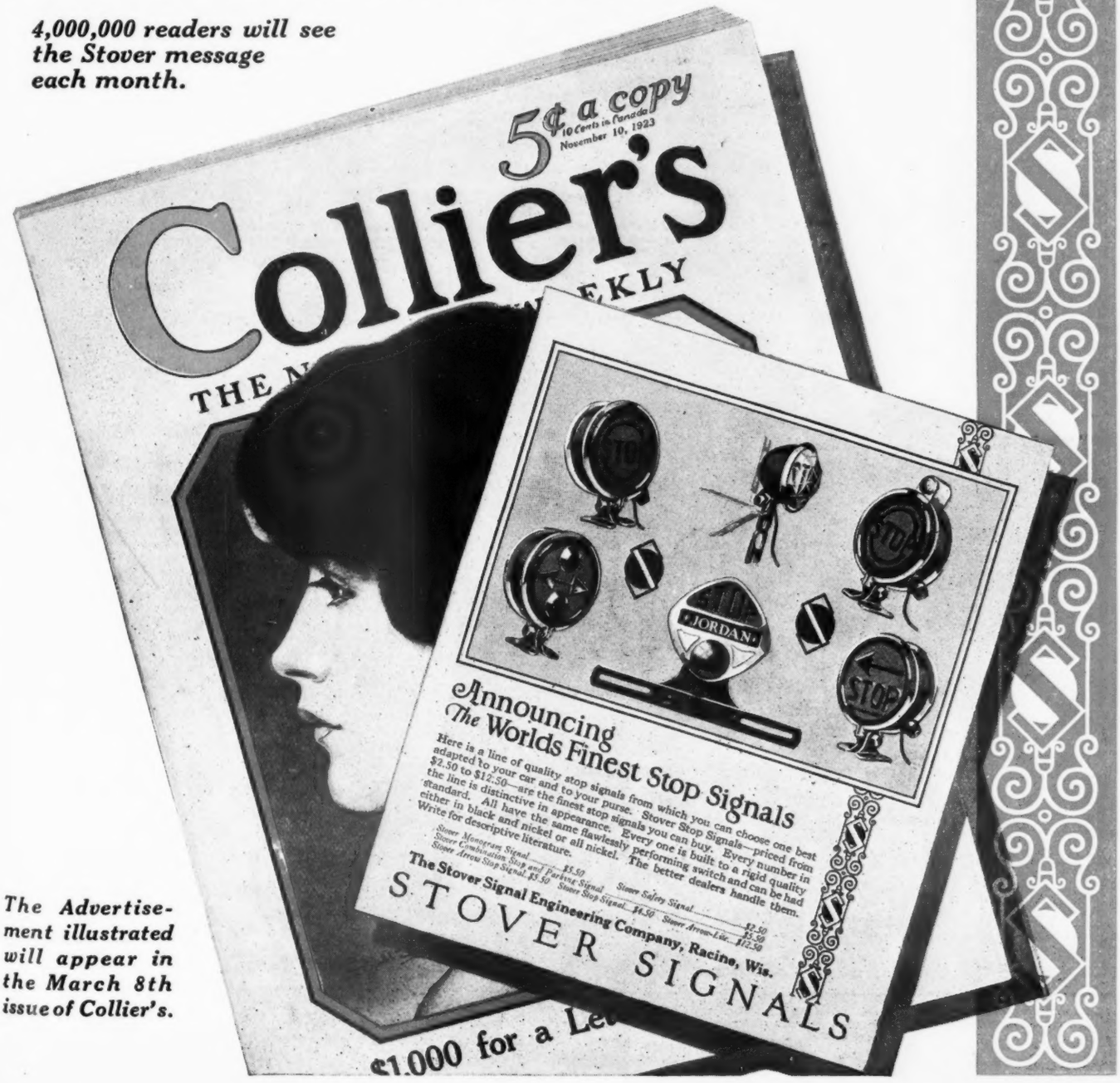
Racine, Wisconsin, U. S. A.

SIGNALS

Every Prospect a Customer

STOVER national advertising in Collier's is reaching 1,000,000 subscribers—4,000,000 readers. It tells in an interesting and convincing manner, the story of Stover Signals and Stover quality. It will bring prospects to you. It will reduce your sales resistance. It will help ***you*** as a Stover Dealer sell every prospect in your town, for Stover Stop Signals are only sold through the legitimate trade channels with ample profit for both dealer and jobber.

4,000,000 readers will see the Stover message each month.


5¢ a copy
10 Cents in Canada
November 10, 1923
Collier's
Announcing
The Worlds Finest Stop Signals
Here is a line of quality stop signals from which you can choose one best adapted to your car and to your purse. Stover Stop Signals—priced from $2.50 to $12.50—are the finest stop signals you can buy. Every number in the line is distinctive in appearance. Every one is built to a rigid quality standard. All have the same flawlessly performing switch and can be had either in black and nickel or all nickel. The better dealers handle them. Write for descriptive literature.
The Stover Signal Engineering Company, Racine, Wis.
STOVER SIGNALS
JORDAN
STOP

The Advertisement illustrated will appear in the March 8th issue of Collier's.

Winter Comfort Will Help Sell Your Car

CAR OWNERS are seeking comfort for year 'round driving. They recognize that a car with a Perfection Heater is unusually equipped to insure that comfort.

Dealers selling Perfection Heater equipped cars thus have a distinct advantage in their sales arguments.

If the cars you handle are not as yet equipped with Perfection Heaters, don't lose a sale on that account. Sell a Perfection Heater every time you sell a car.

Not only is there a handsome profit in it for you, but also you will have a powerful argument in favor of your car.

Your shop services a number of cars each week. Many of these are without heater equipment. Their drivers want winter comfort. They know Perfection Heaters. They offer you an unusual field for profit.

Your jobber is prepared to serve you promptly.

THE PERFECTION HEATER & MANUFACTURING CO.
6545 Carnegie Avenue ∴ ∴ Cleveland, Ohio

Manufactured in Canada by
Richards-Wilcox Canadian Co., Ltd., London, Ont.

A style or type for every car

IMPORTANT

The real works of an automobile heater are hidden under the floor. You can't SEE the quality. Your Safeguard is the Perfection nameplate which you will find in plain view on every Perfection Heater. Look for it.

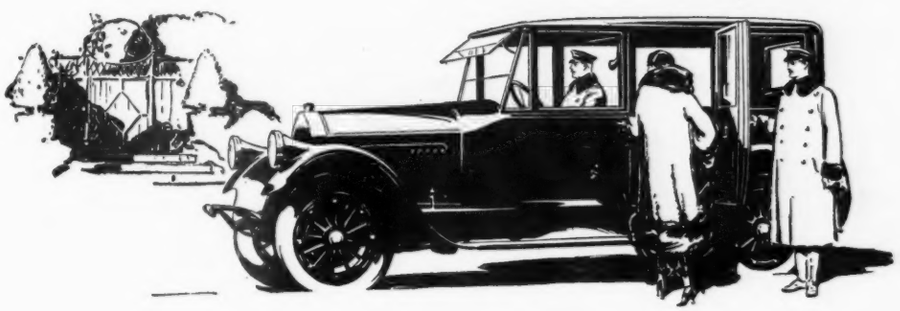
"The heat is there—why not use it?"

PERFECTION MOTOR CAR HEATERS

These manufacturers provide real winter driving comfort by equipping their closed models with Perfection Heaters without extra charge.

Auburn	Cunningham	Earl	Fox	King	Meteor	Paige	Sterling-Knight	*Taxi Cab Equipment*	
Buick 4-Cyl.	Dorris	Elcar	Gardner	Kissel	McFarlan	Pilot	Stevens-Duryea	Anchor Top & Body Co.	Elkhart Motor Co.
Buick 6-Cyl.	Duesenberg	Elgin	Henney-6	Kline	Moon	Premier	Studebaker	Barley Motor Car Co.	Premier Motor Corp.
Case	Durant-4	Flint-6	Hupmobile	Mercer	Nash4and6-Cyl.	R & V Knight	Templar		Rauch & Lang, Inc.
					National	Standard "8"	Velie		Yellow Cab Mfg. Co.
					Oakland	Stephens	Winton		

PIERCE



Do you know how many Pierce-Arrows You could sell in your locality?

More people than ever before, we predict, will buy Pierce-Arrows in 1924.

Do you know what the sales possibilities are in your territory?

We should like to have you ask us. If the valuable Pierce-Arrow franchise is available in your locality, we are prepared to discuss the opportunity which it would offer.

Pierce-Arrow Four-Wheel Safety Brakes are offered as optional equipment at an additional charge.

THE PIERCE-ARROW MOTOR CAR COMPANY
Buffalo, N. Y.

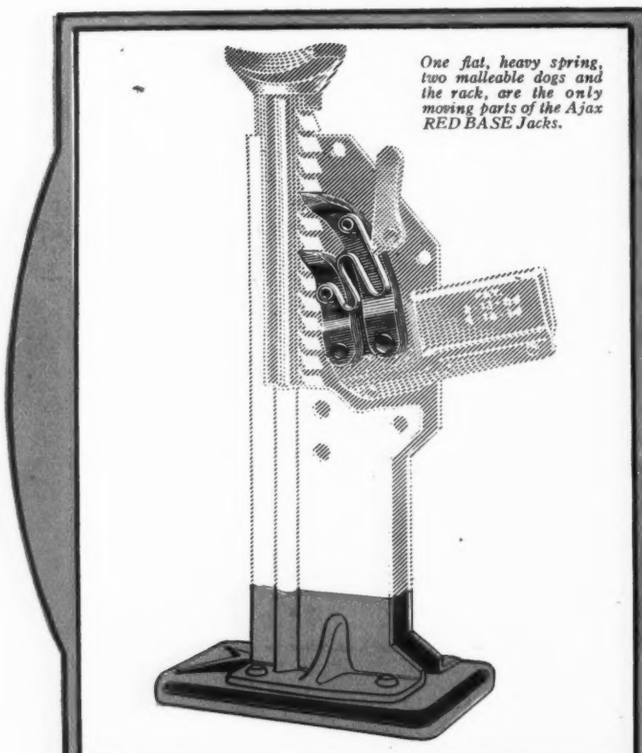
PIERCE-ARROW

ARROW

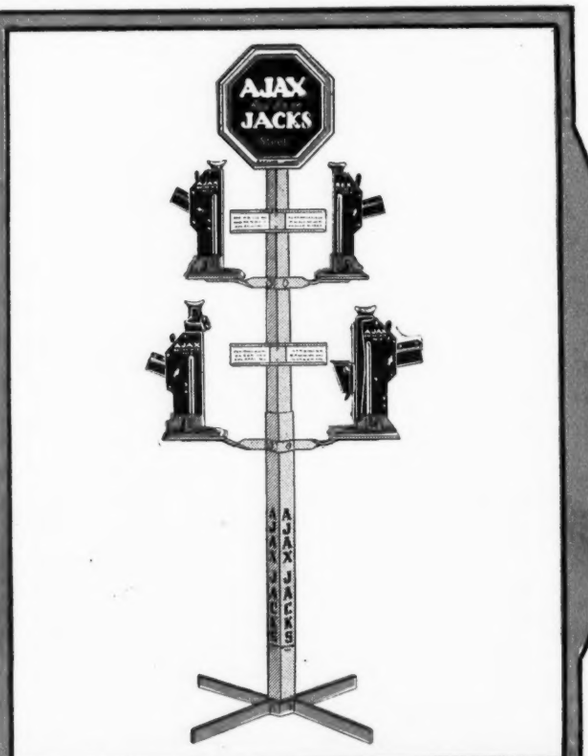
"PRIDE OF ITS MAKERS MAKES YOU PROUD IN POSSESSION"

(386)

Steel the Modern Development In Jack Manufacturing



One flat, heavy spring, two malleable dogs and the rack, are the only moving parts of the Ajax RED BASE Jacks.



Ajax Red Base Jacks are made from steel because steel is strong, light, uniform in quality and unbreakable. They never contain flaws or blow holes as is the case with cast metals.

Ajax Jacks are guaranteed against defects throughout their existence. Strong, quick-acting and light, Ajax Jacks are the most modern development in Jack manufacturing. They are standard equipment on 22 well known makes of automobiles.

The Ajax Red Base Jack line is composed of but four jacks. Those four jacks meet every jack need in the passenger car field. And every one is a steady seller. The investment required to handle this complete line is less than half what is needed to stock other lines. The rate of turn-over on Ajax Jacks is greater because there are no sizes or models for which the demand is slow. Consequently, the net profit on the Ajax Jack line is larger than on others.

The Ajax Display Stand shown above is a tireless hard-working salesman. It not only suggests the purchase of a jack to car owners but answers their questions as to proper size, etc. Put this silent salesman to work for you today. Your jobbers salesman will be glad to tell you how you can secure one FREE without making a big investment.

Ajax Auto Parts Co., Dept. A-501, Racine, Wis.

AJAX RED BASE JACKS

This Advertisement Appears in Leading Automotive Magazines

BURD GILMAN SHOCK ABSORBER

Snubs the rebound

Engineers and Mechanics Approve It

They Use It on Their Own Cars, in Preference to Any Other Device

The Burd-Gilman Shock Absorber is very simple in construction. It has but two moving parts. The steel cable is not affected by rain or mud, sleet or snow, heat or cold. It does not stretch, fray or break, but is "live" and flexible under all weather conditions, responding *instantly* to every movement of the springs and controlling even the slightest recoil. The flexibility and freedom of action of the steel cable eliminates wear and insures durability and satisfactory service year after year.

The action is much like that of the brake band and drum of an automobile, but immeasurably smoother. It automatically releases when the springs compress and takes hold when they rebound, with a smooth, easing resistance which snubs all excessive rebounds and gives positive spring control.

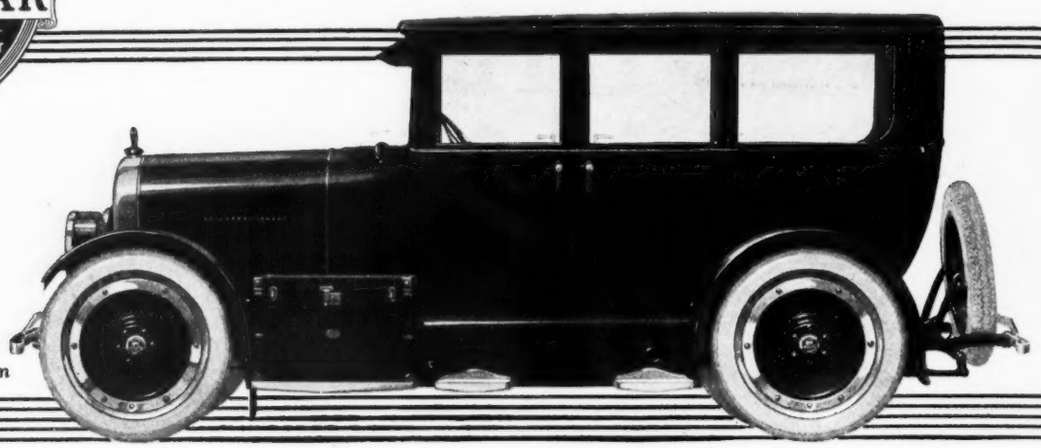
One type and size of fittings, furnished with each set, is adaptable to 97% of all passenger cars of present day manufacture. This is a distinct advantage to both dealer and car owner.

Write for Descriptive Circular and Dealers' Discounts

BURD HIGH COMPRESSION RING COMPANY, *Rockford, Illinois*

ELCAR
A WELL BUILT CAR

$1625 [f.o.b. Elkhart, Ind.]



4-Cylinder Sport Sedan

See the light car aristocrat at the Show

Your visit to the show will not be complete until you have seen and sat in and talked about ELCAR, the aristocrat of light cars by virtue of appearance, quality and performance. You must do all these things before you can safely accept an agency for any light car, because without knowing ELCAR you cannot make proper comparisons. By all means, visit the ELCAR booth, go over the car thoroughly, study its engineering and body design, examine its astonishing coachwork, get full details of the ELCAR offer to dealers, and then make your decision as to the light car you will handle in 1924.

SIXES
Continental Motored
Closed and
Open Models

ELCAR

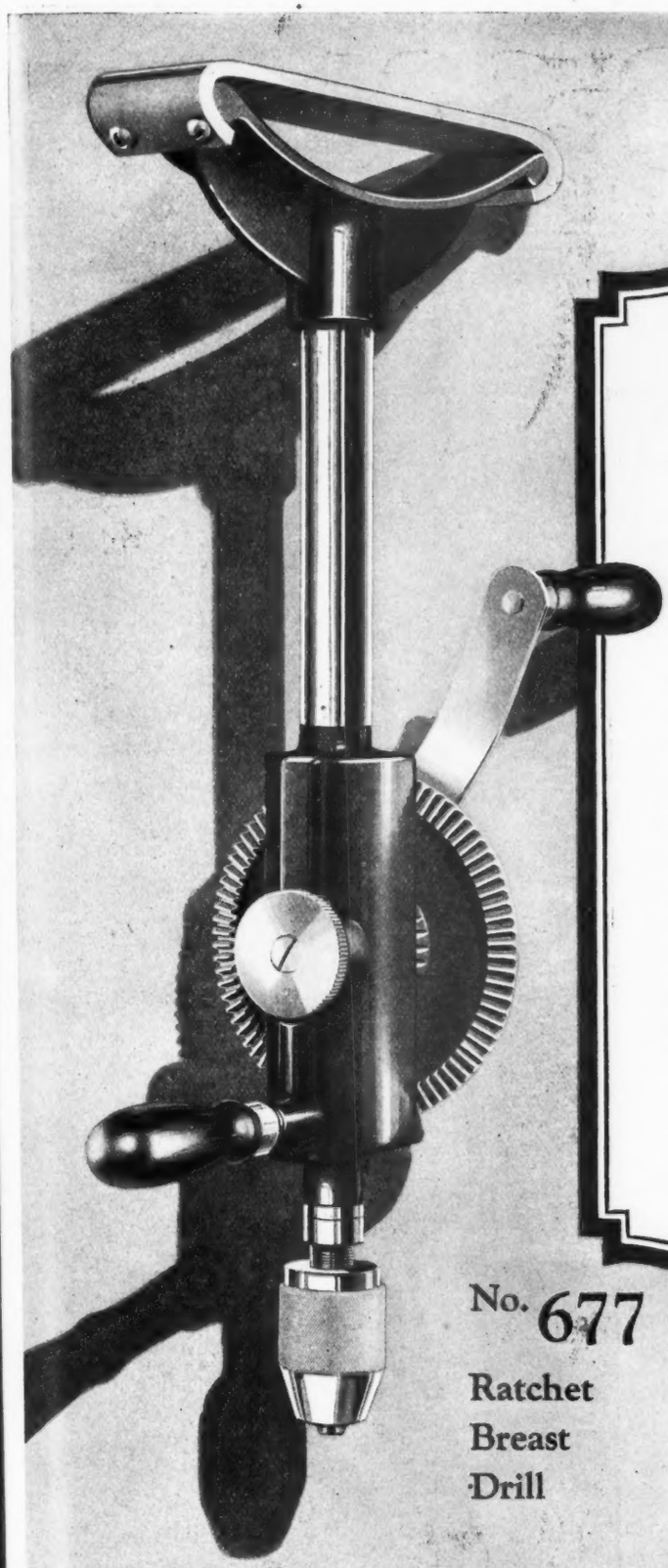
FOURS
Lycoming Motored
Closed and
Open Models

A WELL BUILT CAR

ELCAR MOTOR COMPANY, Elkhart, Indiana

Builders of Fine Vehicles Since 1873

*At The Chicago Show—*BOOTH 39, *Coliseum Annex*



A light-weight breast drill

with trouble-proof ratchet mechanism

Here is a sturdy, moderately-priced drill for the garage man, mechanic, or anyone who bores holes in metal.

Equipped with a simple, "fool-proof" ratchet mechanism. Changes of speed and changes of motion are made by a turn of the dial on the back of the frame.

Frame is made of aluminum alloy—strong but light weight. The steel spindle runs on ball bearings which take up end thrust. The all-steel chuck has three hardened jaws for holding round-shank drills 0 to ½ inch.

Just one of 1500 Good Tools

Every mechanic ought to have a copy of the Goodell-Pratt Catalog—a 448-page book that illustrates and describes each of the 1500 Good Tools. A postcard will bring your copy—free.

GOODELL-PRATT COMPANY
GREENFIELD, MASS., U. S. A.

Toolsmiths
Makers of Mr. Punch

No. 677
Ratchet
Breast
Drill

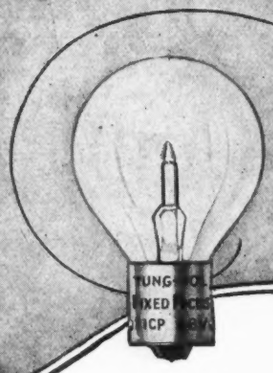
GOODELL-PRATT

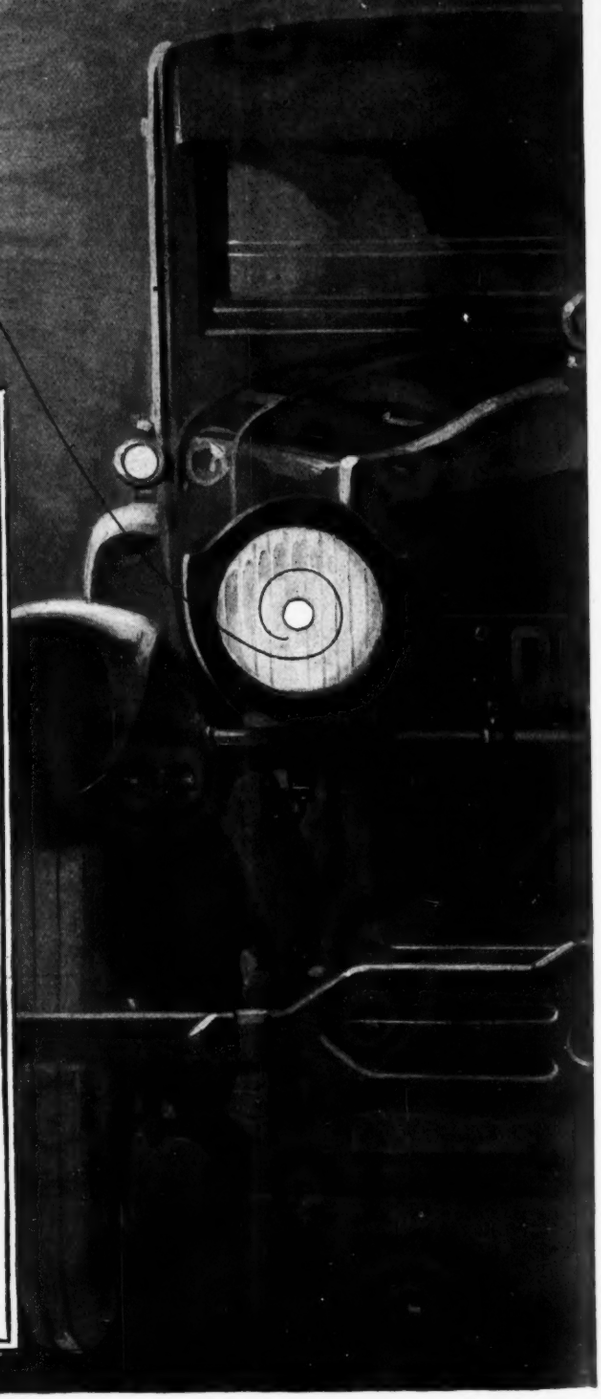
1500 GOOD TOOLS

TUNG-SOL

"Fixed-Focus" and "FLATLITE" Lamp Bulbs

Approved for Flatlite and Other Parabolic Reflectors





THE new Flatlite Reflector equipped with TUNG-SOL Fixed-Focus bulbs brings to any automobile highly perfected road illumination.

With the Flatlite Reflector the source of light must be at the exact focal point.

It is the unerring accuracy with which TUNG-SOL Fixed-Focus bulbs are made that enables them to meet this requirement.

Flatlite fitted with TUNG-SOL Fixed-Focus bulbs has been adopted as standard equipment by automobile manufacturers and officially approved by those states having the largest car registrations.

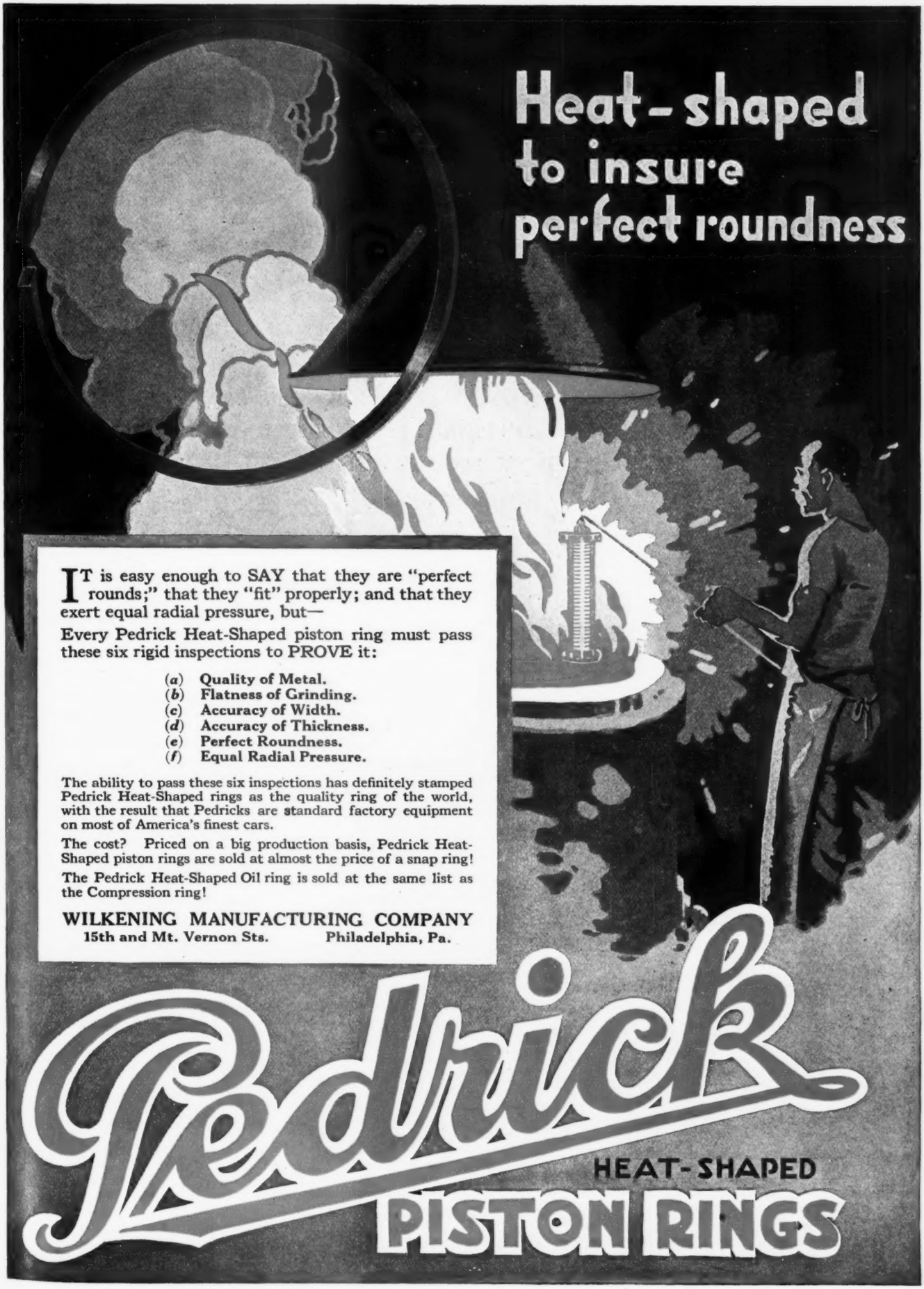
For any lamp requirement and particularly for Flatlite, sell TUNG-SOL Fixed-Focus Bulbs.

We shall be pleased to furnish detailed information.

MINIATURE INCANDESCENT LAMP CORPORATION
Newark, N. J.

Licensed Under General Electric Company's Incandescent Lamp Patents

"Let Tung-Sol Light the Way"


Heat-shaped
to insure
perfect roundness
IT is easy enough to SAY that they are "perfect rounds;" that they "fit" properly; and that they exert equal radial pressure, but—
Every Pedrick Heat-Shaped piston ring must pass these six rigid inspections to PROVE it:
(a) Quality of Metal.
(b) Flatness of Grinding.
(c) Accuracy of Width.
(d) Accuracy of Thickness.
(e) Perfect Roundness.
(f) Equal Radial Pressure.
The ability to pass these six inspections has definitely stamped Pedrick Heat-Shaped rings as the quality ring of the world, with the result that Pedricks are standard factory equipment on most of America's finest cars.
The cost? Priced on a big production basis, Pedrick Heat-Shaped piston rings are sold at almost the price of a snap ring!
The Pedrick Heat-Shaped Oil ring is sold at the same list as the Compression ring!
WILKENING MANUFACTURING COMPANY
15th and Mt. Vernon Sts. Philadelphia, Pa.
Pedrick
HEAT-SHAPED
PISTON RINGS

EATON AXLES

"EATON MEANS EXCELLENCE"

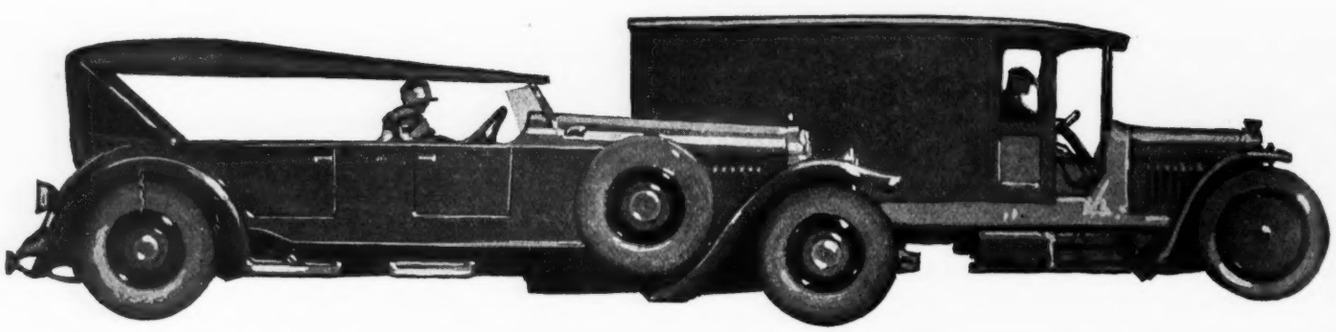
Wherever the Eaton trade-mark is found the product which bears it is stamped as one of sterling quality. Eaton is a synonym for excellence in the automotive world.

When a car or truck salesman says "Eaton Axles," he has pledged more than the ordinary measure of service and satisfaction.

Whether bevel, worm or double reduction internal gear, Eaton Axles everywhere are performing quietly, dependably and efficiently. It is not to be wondered at that the cars and trucks using them are among those which stand highest in the public esteem.

We are prepared to furnish the Lockheed Hydraulic Four Wheel Brake system with Eaton Axles to those car manufacturers who desire such equipment.

CHICAGO SHOW EXHIBIT
COLISEUM, SECTIONS 81-82



The EATON AXLE & SPRING

PERFECTION SPRINGS

First to establish the all-important factor of proper heat treatment for springs—

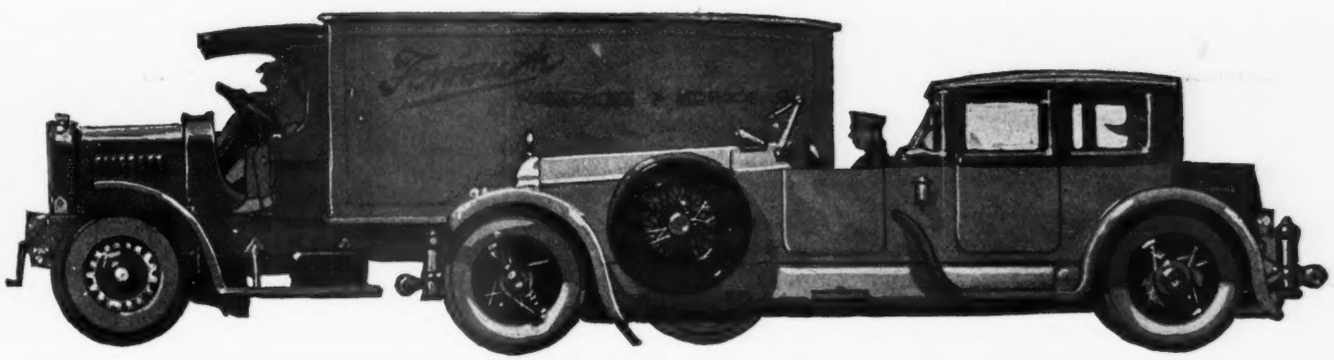
First to have a laboratory for determining the chemical and physical analyses of spring steels—

Designers of spring suspensions for many of America's finest cars and trucks—

The men who make Perfection Springs have a reputation to live up to. With new equipment and the latest scientific improvements, they continue this year as in the past to supply the spring equipment for many of the leading cars and trucks.

"Resilient as a Lancewood Bow"—Perfection Springs are famous for their splendid riding qualities. Automobile dealers all recognize the figure of the Perfection Archer as symbolizing good spring suspension.

An EATON PRODUCT



COMPANY ~ ~ ~ Cleveland

Over 300% Increase In Replacement Business

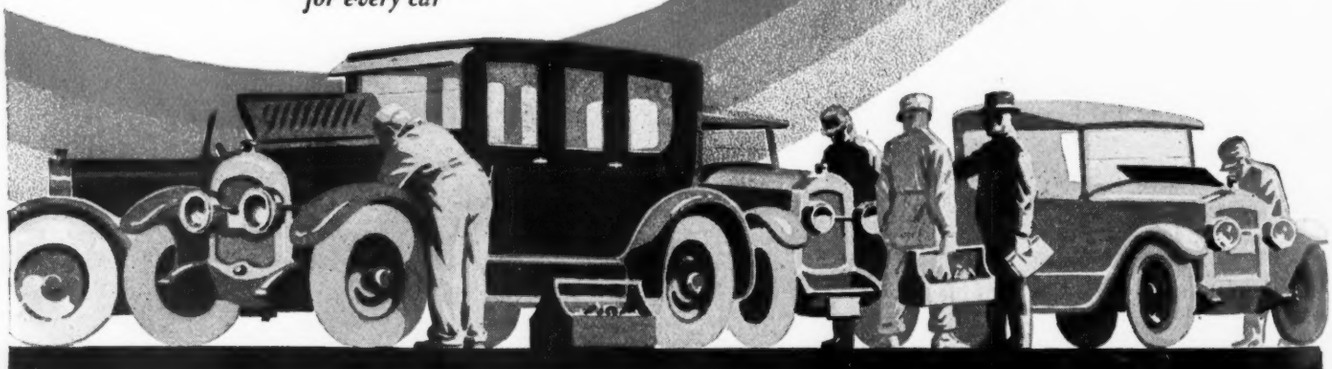
—and all in a short time. It's a phenomenal record for Stromberg Carburetors—it is the result of building a special carburetor for each car—one that is designed to consume a minimum amount of gasoline and at the same time improve the performance of the motor in general.

Don't blame your car because it doesn't perform the way you think it should—it's probably the carburetor—have it removed—put on a special Stromberg and be surprised at the economy, easier starting, quicker get-a-way and increased power.

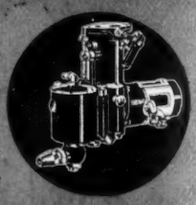
See your dealer or write direct mentioning name, year and model of your car.

THE STROMBERG MOTOR DEVICES COMPANY
64 East 25th Street, Chicago, Illinois
Dept. 227

A special Stromberg Carburetor for every car



New STROMBERG CARBURETOR Does it!



Making a Round Shank Screwdriver That Can't Turn In The Handle.

PINNING the handle, shank and ferrule has been the accepted way of making round shank screwdrivers simply because no better way was known.

Screwdrivers, consequently, have always lacked the perfection of other tools—*pinning will not hold the parts secure.*

After seven years we have developed the *really perfect* screwdriver, one whose shank will never turn or ferrule loosen or fall off. This we have accomplished *without pinning.*

First we forge a series of round projections or lugs on both sides of the shank. The shank is then forced down through the ferrule into the wood where it forms separate "grooves", locking itself so securely that the handle must be destroyed before the shank can turn.

The ferrule, instead of being glued and forced on, is *crimped.* This crimping pressure holds the ferrule tightly in place forever.

The Vlchek method is the most advanced ever employed in making round shank screwdrivers. Contrast its obvious advantages with the old method of driving a pin of the same diameter as the lead in a pencil, and little more strength, through ferrule—wood—shank—wood and ferrule, and expecting it to hold the parts secure against the pressure exerted by a strong hand.

No one ever throws away a Vlchek Screwdriver—it's a compact, sturdy, enduring tool. We also make Square Shank, Electricians' Hammer Head, All Steel and Offset Screwdrivers. *Write for Catalog.*

THE VLCHEK TOOL COMPANY, CLEVELAND, OHIO

EASY TO SAY VELCHEK

VLCHEK TOOLS

MADE BY THE WORLD'S LARGEST PRODUCERS OF TOOL KITS

KEYSTONE

The Genuine and Original Radiator Cap

With Initials — Monograms & Emblems

The Stalock Model

Keystone Stalock Model has attained popularity along with the Senior and Junior models because of beauty of design and practical construction. When radiator is filled—just push down on hinged cover—a spring clasp holds it—giving a perfect water and steam tight joint.

All Keystone models have the hinged cover which lifts backwards for radiator filling.

When a Keystone Cap is sold—it stays sold—makes friends, creates good will for the dealer—thereby increasing accessory business. They are self locking—no installation—no service and will outlast the life of the car.

Keystone Stalock and Senior models fit all cars. Junior model made especially for the smaller cars. The same initial and emblem plates fit all models.

Ask your jobber to show you the Keystone models.

List Prices

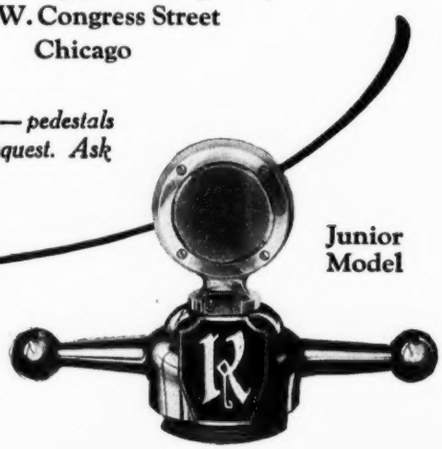
Stalock .	$6.00
Senior .	6.00
Junior .	4.00

Including initial or emblem plate.

The Norlipp Company
568 W. Congress Street
Chicago

Window displays—counter cards—pedestals and folders will be furnished on request. Ask your jobber or write us.

Senior Model



Junior Model

Announcing!

1 Four New BOSCH Products –

2 A Quality Line of Accessories –

3 New Sales Plan –

1 The New BOSCH Products

BIGGEST BOSCH ADVERTISING CAMPAIGN STARTS FEB. 1ST —Will make it easy to sell these useful Accessories.

Windshield Wiper

(Electric)

A powerful, automatic, dependable unit of the highest quality. It will not stick or get out of order.

Costs nothing to run—uses less than 1¼ amperes—has negligible effect on the battery.

It's quiet—no train of gears to hum or rattle—parts are few, design is simple.

Speed is constant—not dependent on the throttle, or the speed of the car.

It is compact — does not protrude to impede the driver's vision.

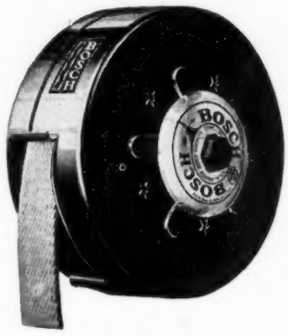
Easily installed—requires no attention—guaranteed to give complete satisfaction.

Sells at sight—always stays sold.

Price $9.50

Shock Absorber

"Absorbs Spring Recoil"



The Bosch answer to all existing shock absorber shortcomings.

Big improvement over other types — highly efficient — instantaneous in action—always smooth and quiet in operation.

Slows up the spring rebound easily and gradually—not with a jerk or jolt.

It's adjustable—can be easily adjusted to suit any driver's requirements or road conditions.

PRICES PER PAIR

Type A—For Fords	$10
" B—Medium Cars	15
" C—Heavy Cars and Trucks	20

Easy to install—requires no attention.

Any dealer can sell them easily — any mechanic can make installations.

Spark Plug

"The Red Plug"

A QUALITY job through and through—new carbon-proof design—gas tight construction—gives wonderful service even under the most adverse conditions.

Insulator is made of "Ambosite," a new non-clay chemical composition having remarkable strength and insulating properties. Intense heat won't crack it, high voltage can't puncture it.

Electrodes are nickel steel—their crescent shape insures big, fat spark.

The Bosch Plug is made in only five types, serving all engines. Makes possible a small inventory, rapid turnover, and quick profits.

PRICES

Regular sizes	$1.00
Ford size	75c

Ford Ignition System

Type 600

A wonderful new ignition system—big, rugged, dependable, efficient, and waterproof—with automatic spark advance and many new features—

Makes starting easy—adds power and speed—saves gas and repairs—keeps plugs clean—prevents all ignition troubles.

Suitable for all Ford models—anyone can install it.

A quick seller—exactly meets the Ford Owner's requirements—the price fits his pocket book.

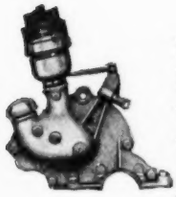
You can sell it on trial—your money back if you or your customers are not satisfied.

Price $12.75

2 *The* Line of BOSCH Accessories

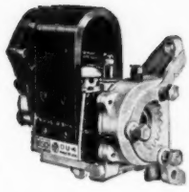
It's a COMPLETE Line – every one a necessity
It's a QUALITY Line – and pays big profits

De Luxe Ford Ignition



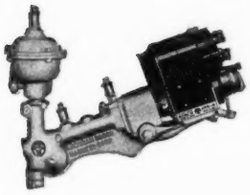
Includes the Bosch Timer and Coil. Has Bosch Compensating Governor, which automatically advances and retards the spark to exactly meet the Ford engine characteristics. Wonderfully efficient—extremely popular.

Magneto Fitting for Fords



Enables you to install the world famous Bosch Magneto as used on high priced cars, trucks, tractors, etc. No coils, battery or timer necessary. Especially suited to Ford trucks and cars.

Magneto Fitting for Fordsons



Provides Bosch High Tension Magneto Ignition for Fordsons. Eliminates coils and timer. Prevents all ignition troubles. Installed with, or without, the Bosch Impulse Starter Coupling, and Throttle Governor.

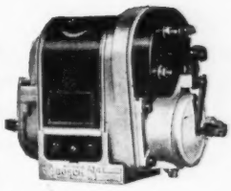
High Tension Coil

Steel enclosed and hermetically sealed—strong, efficient, waterproof and dependable. Will withstand rough treatment and produce intense sparks at all times, regardless of weather conditions.

Lighting and Ignition Switches

Made in a variety of styles and finishes—supplied with, or without ammeter, dash light, lock and resistance unit. Large brass contacts and strong tension springs insure perfect contacts at all times.

High Tension Magnetos

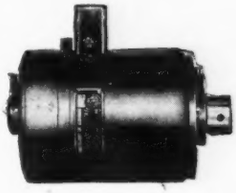


The world's most dependable ignition system—over four million in use today—in demand everywhere for use on cars, trucks, tractors, motorcycles, motor boats and stationary engines.

Battery Ignition Systems

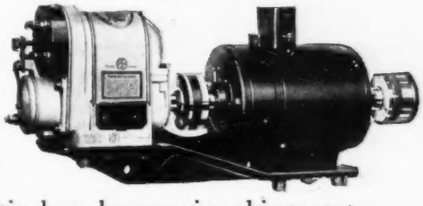
Special Bosch Fittings are made for installing Bosch "Compensating" Battery Ignition in place of less efficient systems. There is a wide sale for these fittings—replacements can be made on all popular makes of cars.

Lighting and Starting Systems



Many dealers are doing a nice business with fleet owners by equipping their trucks with Bosch Generators and Starting Motors. Special Bosch fittings enable any mechanic to make installations easily.

Taxi Fittings



This Bosch Magneto and Generator Attachment is designed especially for taxicab installation. Thousands of taxis in the larger cities have been equipped in recent months. The demand is rapidly growing.

Bosch Service Parts

Contact points, brushes, ball bearings, and many other parts are in constant demand everywhere. Liberal trade discounts and quick turnovers make it extremely profitable to handle "fast moving" Bosch parts.

3 The New BOSCH Sales Plan

Why YOU Should Sell the BOSCH Long Line

There are many products, every one a necessity—
All are QUALITY units—sold at popular prices—
All are fully guaranteed by the Bosch Corporation—
Discounts are liberal—turnovers frequent—
Real selling aids are provided—

All you have to do is sell them—750 Bosch Service Stations keep them serviced—

The biggest advertising campaign ever launched by Bosch will start February 9th in The Saturday Evening Post and other national magazines—it will be easy to sell the Bosch Line in 1924.

You Can Profit Still More by Becoming a Bosch Dealer

The requirements are simple—the benefits many. Some of the advantages you would get are—

Special discounts on all Bosch material.
Greater profits through increased sales.
Personal assistance from Bosch salesmen.
New markets, and added prestige locally.
Reference books, sales literature, etc.
Sales promotion and advertising service.

For full particulars, fill out coupon and mail TODAY

AMERICAN BOSCH MAGNETO CORP.
Main Office and Works: Springfield, Mass.

BRANCHES

17-23 W. 60th St.
New York

3737 Michigan Ave.
Chicago

89-95 Hancock Ave. W.
Detroit

1262 Post St.
San Francisco

Fill Out and Mail this Coupon TODAY

American Bosch Magneto Corp.: Send me full particulars about your—

- ☐ Shock Absorber, and
- ☐ Windshield Wiper, and
- ☐ Spark Plug, and
- ☐ Ford Ignition System Type 600
- ☐ Complete Line, and

- ☐ Send Sample Set C. O. D. for a ..... car.
- ☐ Send a sample C. O. D.
- ☐ Send Sample Set C. O. D. for a ..... car.
- ☐ Send a Sample C. O. D.
- ☐ Bosch Dealer Proposition.

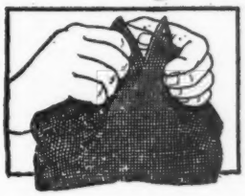
First samples will be shipped at quantity discounts

Firm Name .....
Street Address .....
City ..... State .....
Date ..... Signature .....

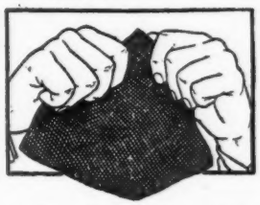
GATES BELTS

"The Standardized Fan Belt"

Try this test



Take a piece of light fabric that you can tear easily in this manner—that is, straight across. Then try to tear it **diagonally** as in the next picture.



You find that it has double strength **on the bias** — a good illustration of the extra strength and durability of the **bias weave** construction.

You know from experience that any fabric has double strength on the **bias.** That's exactly why Gates Vulco Belts have double strength and durability. They are built with the **bias weave** construction (patented).

Made by the World's Largest Manufacturers of Fan Belts

Get these on your

Welco "Neva-Lost" Gas Tank Cap

$2.00

HERE'S something motorists are waiting for—a gas tank cap that doesn't take a half an hour to unscrew and can't get lost. A quarter turn of the bar handle and it's opened or locked without soiling hands or having to dig in the tool kit for a wrench, as is sometimes necessary with screw caps that are screwed on too tight. The Welco Neva-Lost cap screws on to the tank permanently by means of the screw threads on the interior of the lower half.

The top of the cap is provided with a solid cork washer which fits snugly to the lower half when closed, preventing loss of gasoline from slopping or evaporation. The spring tension catch on the lower part of the bar handle slips beneath the extensions on the lower half of the cap and locks the cover down firmly. The Welco Neva-Lost Cap may also be used as a radiator cap—there's a chance to sell them two at a time! Handsomely nickel-plated and put up with attractive display stand. Assortment consists of twelve caps which cover the sizes for over sixty popular makes of cars. Individual Welco Neva-Lost caps are put up in a substantial box with size number and makes of cars to which the specified number is adaptable. Get this business booster on your counter!

Welco

TRADE
Welker-Hoo
Middlet

big three counter!

Welco Foot Accelerator for Fords

It works independent of the hand throttle filling a need Ford owners have always wanted, and sells at a price they can't resist! Well constructed and finished in superior gun metal blue. Can be easily attached in a few minutes—requiring the drilling of only one hole in the floor board. Adjustable to any desirable idling speed. What Ford owner will pass this up at $1.50—and there's a substantial profit for you!

Packed in an attractive carton with full instructions and diagram for installation. Display board for counter use furnished.

$1.50

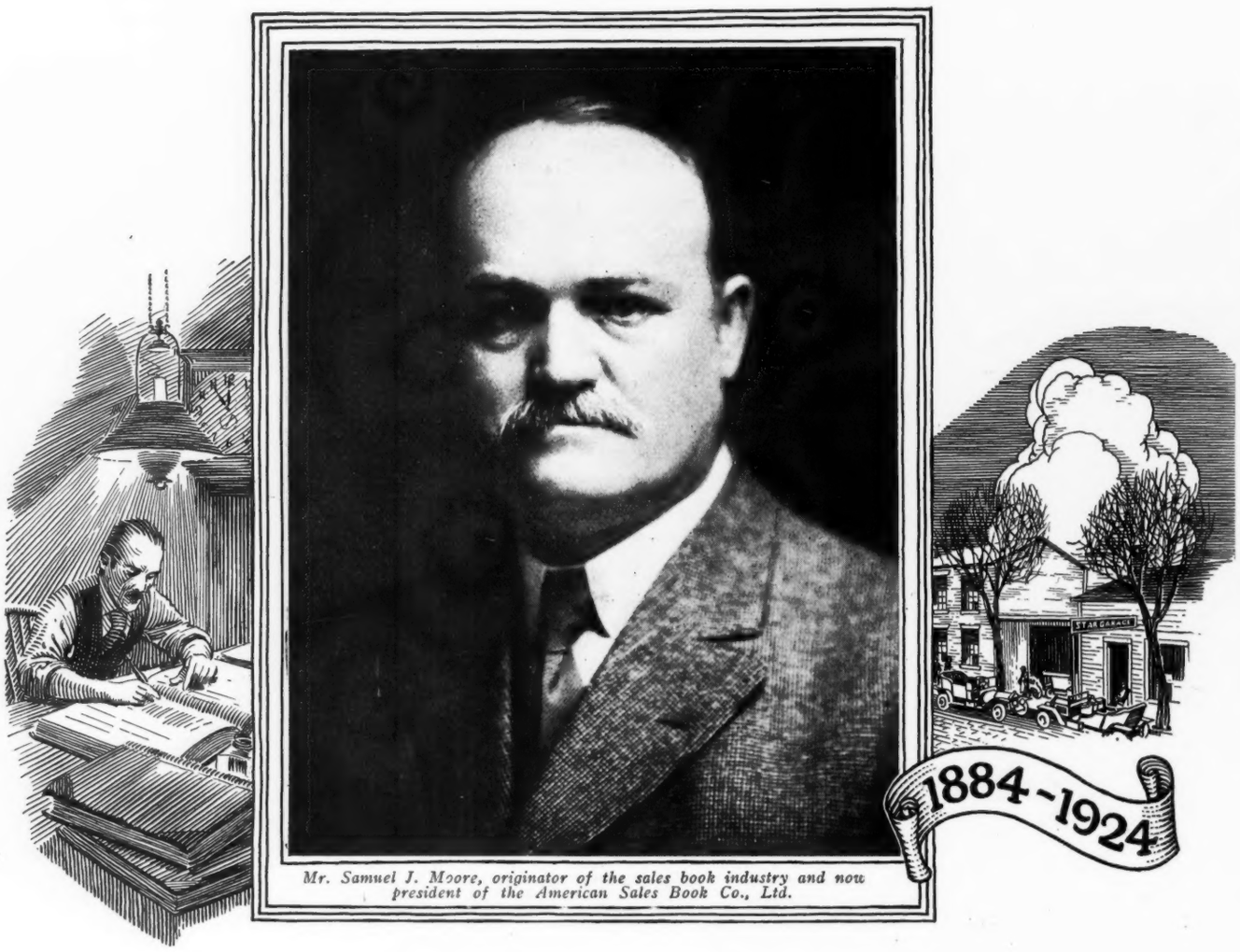
Welco "Glare-Stop" Shield

$1.00

Every driver realizes his need for protection against sun-glare and dazzling headlights and is ready to purchase a device that eliminates this hazard—but it must be practical and inexpensive! The Welco "Glare-Stop" Shield makes these prospects dig gladly for its convenience. It fits inside on the windshield, to any desired line of vision, by means of two powerful gripping rubber suction cups which will hold indefinitely. The shade is made of deep green Viscoloid and swings up or down on a cross-bar that is backed by a spring piece, holding it to any set angle. All metal parts are made from aluminum alloy and will not rust. Put the Welco "Glare-Stop" on your counter with a strong electric light behind it and they'll want to know the big idea—then you can sell them easily.
Packed in a catchy carton with illustration of use and instructions for applying.

MARK
ps Mfg. Co.
own, Ct.

Products



Mr. Samuel J. Moore, originator of the sales book industry and now president of the American Sales Book Co., Ltd.

A Birthday in Which Every Automobile Man is Interested

Accurate written records of every transaction, whether it be repair, purchase or sale of a car, accessories, parts or gas and oil, have done as much as any one factor to help thousands of automobile dealers, garages, supply houses, service and filling stations grow in size and prosperity. These records result from the use of the latest most improved sales books.

The originator and builder of the great sales book industry was Samuel J. Moore, now President of the American Sales Book Company, Ld., which this year celebrates its fortieth birthday.

It is only natural that the American Sales Book Company, Ld., and its associated companies should be today the leaders, since they have developed over ninety-five per cent of the worthwhile improvements in the sales book industry. Their representatives at over one hundred points of the United States and Canada know the best sales recording methods of the leading automobile dealers, garages, service stations, supply houses and filling stations. They can help you select the proper method of handling your sales records.

The Sure-Trip and Sure-Quad Sales Books are the fruition of 40 years of sales book development. They are built on the most advanced ideas and

The automotive industry has been aided materially in its growth through this system of accurately recording and checking every transaction.

through the development of special machinery for inserting a pasted sheet which makes possible more copies in one writing. Often two or more sets of records are combined in one by using these books.

Sure-Trip and Sure-Quad eliminate lost, forgotten or duplicated charges. They stop unjust claims for adjustments. They provide a check on employees, pointing out the loyal and efficient as well as the undesirable. Stocks of accessories and parts are maintained just as you desire them.

Three or four copies are made in one writing. All checks are printed. All may be perforated as desired. All sheets are joined together when detached from book. The Sure-Trip and Sure-Quad books are operated as quickly as any duplicating book made.

Follow your inclination to investigate. Fill out the coupon below, attach it to your business letterhead, state the particular uses you are thinking of for these books and send it to our nearest plant. Our men will do the rest.

American Sales Book Company, Limited

ELMIRA, N. Y.

West of the Rockies—
Pacific Manifolding Book Co., Emeryville, Cal.
Pacific Coast Sales Book Co., Los Angeles, Cal.

In Canada—
F. N. Burt Company, Ld., Toronto.

American Sales Book Company, Ld.
Dept. 7281, Elmira, N. Y.

Without incurring obligation I would like to know more about your Sure-Trip and Sure-Quad Sales Books, as described above, for the following uses.

Uses .....
Firm .....
My Position .....
Name .....
Address .....

Note: We might be interested in other duplicating forms such as .....(see my letter)

MOTOR IMPROVEMENTS, INC.

INTRODUCES
TO
THE AUTOMOTIVE INDUSTRY
THE

M. I. C.

("MOTOR IMP")

OIL PURIFYING SYSTEMS

For Automobiles, Trucks, Tractors, Motor Boats, Airplanes and All Types of Internal Combustion Engines

Also

Oil Reclaiming Systems for Garages and Industrial Plants

WHAT IT DOES—FOR THE OIL

Removes all Contamination, such as—

A. Carbon, Road-dust, Grit, Etc.
B. Water—prevents freezing of the Oil-pump in winter.
C. Metal particles from crank-case castings, bearings, etc.
D. All abrasives — even the finest microscopic particles.

WHAT IT DOES—FOR THE MOTOR

Positively insures—

A. Continuously clear, smooth lubrication.
B. Longer life through reduction of wear on bearings and all moving parts.
C. Reduction of friction—better power.
D. Decreased oil consumption.

WHAT IT DOES—FOR THE OWNER

Assures Him—

A. Reduced repair bills.
B. Lower cost of maintenance.

AND

ELIMINATES THE DISAGREEABLE NECESSITY FOR FREQUENT DRAINING AND CLEANING OF THE CRANK CASE!!

80% of All Motor Trouble Is Caused by Contamination of the Oil. The M. I. C. ("Motor Imp") Oil Purifying Systems Eliminate That 80%

Approved and Adopted as STANDARD EQUIPMENT

by three of the Industry's ablest Engineers

The M. I. C. SYSTEM

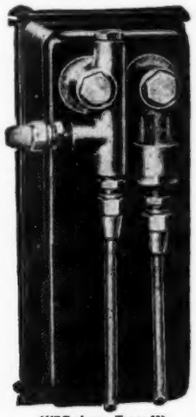
("MOTOR IMP")

contributed strikingly toward making a new car one of the sensations of the

NEW YORK SHOW

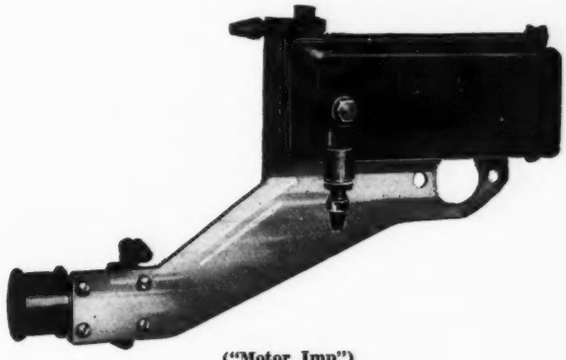
Provides a continuous purifying process absolutely independent of the flow of oil to the bearings and other moving parts of the motor.

Easily applied to any Car, Truck or Engine at low cost of installation.



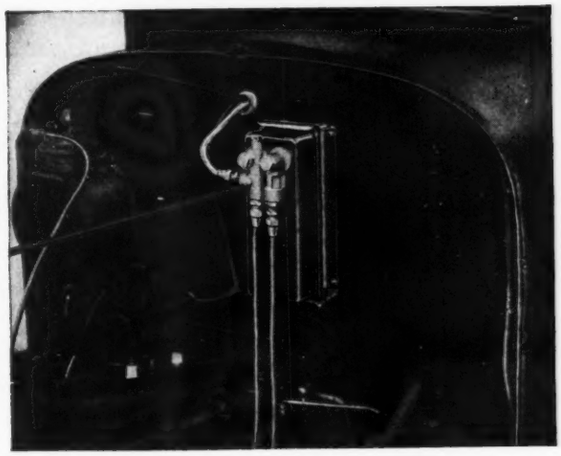
("Motor Imp")
TYPE A
For Passenger Cars

("Motor Imp")
TYPE T
(cleanable)
For Trucks and Tractors



("Motor Imp")
TYPE F
For Fords

("Motor Imp")
TYPE G
Oil Reclaimer for Garages and Industrial Plants



Typical ("Motor Imp") Installation

MOTOR IMPROVEMENTS, INC.

Manufacturers and Distributors of

("MOTOR IMP") SYSTEMS

General Offices **Fisk Building** **New York**

Of great interest to the Garage Operator and Industrial Plants is the ("Motor Imp") Type G Oil Reclaimer, which is specially designed to handle large quantities of crank-case drainings, is automatically operated without any attention and makes possible the reclaiming and resale of used crank-case drainings that have heretofore been thrown away.

ARVIN Tire Pump

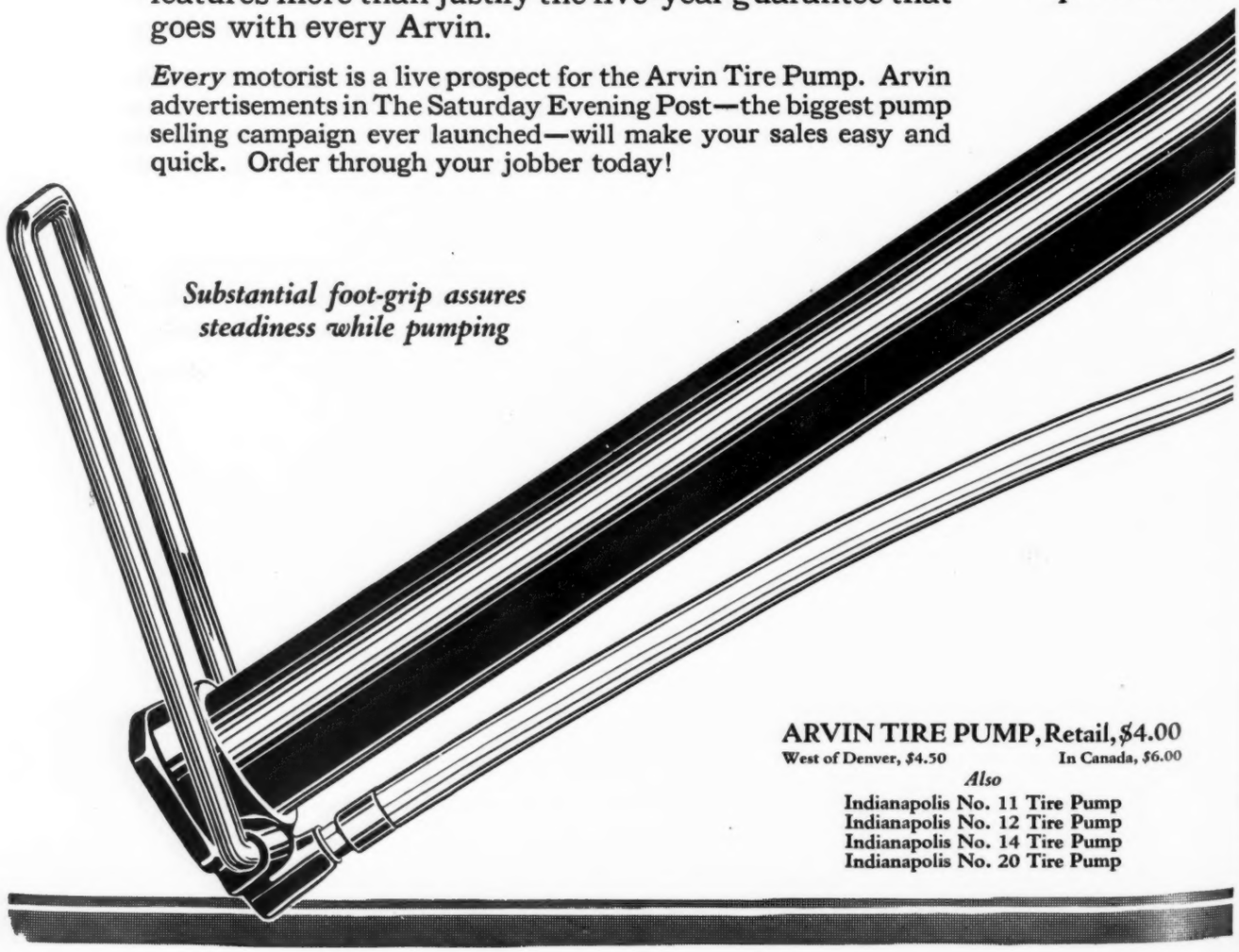
ARVIN—the biggest and most substantial tire pump on the market—will be the biggest seller to car owners seeking a *dependable* pump, guaranteed to operate with speed and ease for many long years!

In size and substance the Arvin is unsurpassed. Its gigantic barrel and faultless plunger construction make short work of flat tire jobs. The long barrel of enormous capacity, comfortable handle, sturdy foot-grip, thirty-inch hose with handy valve connection and many other features more than justify the five-year guarantee that goes with every Arvin.

Barrel "thigh high" —a back-saving improvement

Every motorist is a live prospect for the Arvin Tire Pump. Arvin advertisements in The Saturday Evening Post—the biggest pump selling campaign ever launched—will make your sales easy and quick. Order through your jobber today!

Substantial foot-grip assures steadiness while pumping



ARVIN TIRE PUMP, Retail, $4.00

West of Denver, $4.50 In Canada, $6.00

Also

Indianapolis No. 11 Tire Pump
Indianapolis No. 12 Tire Pump
Indianapolis No. 14 Tire Pump
Indianapolis No. 20 Tire Pump

Thirty-inch hose reaches tire valve at any position

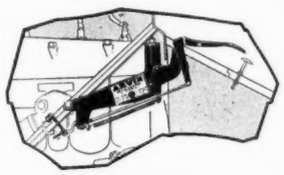
Oversize handle allows easy, natural grip

HITCH YOUR WAGON TO THIS FORCEFUL SELLING CAMPAIGN

The Arvin Tire Pump, with the Arvin Accelerator, Arvin Cowl Ventilator and Arvin Heater, comprise the Arvin line of motor accessories—a profitable, quick-selling line backed by continuous, year-'round advertising.

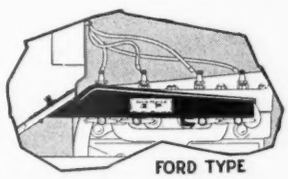
Dealers from coast to coast are lining up now with the aggressive Arvin advertising campaign in The Saturday Evening Post. You, too, should cash in on this powerful backing. Don't miss a single sale. Order from your jobber now!

INDIANAPOLIS PUMP & TUBE CO.
INDIANAPOLIS
Factory and office at Greenwood



ARVIN ACCELERATOR
for Ford Cars

Assures smooth, steady control over roughest roads. The Arvin does not interfere with removal of foot-boards or floor covering. Equipped with pedestal foot rest. Packed completely assembled in carton, ready to install. Installation unusually simple. Price, complete, only - **$1.75**



FORD TYPE

ARVIN HEATER

Most efficient manifold jacket heater on the market. Made for Ford (including steel-dash models), Chevrolet, Dodge and Maxwell cars. Half-million sold in 1923. Price, Ford type - - $1.75

ARVIN COWL VENTILATOR
For Ford, Chevrolet, Star and Gray cars. Rust-proof wire screen keeps out bugs and insects. List price only - - $1.75

ARVIN MOTOR ACCESSORIES

Arrow Head

Pistons
Piston Pins
Axle and Drive Shafts

Dependable Products

ARROW HEAD STEEL PRODUCTS CO.
MINNEAPOLIS, MINN., U.S.A.

Belongs Where It Goes Goes Where It Belongs

A snappy display stand makes AGATE easy to sell. We supply it without charge. It tells more at a glance than twenty minutes' talking. It shows the sturdy construction of the AGATE'S switch, which is guaranteed for the life of the car.

Agate STOP SIGNAL

HOW often have you eaten up your profit drilling holes and tightening bolts to install a stop-light?

How often have you heard a customer cuss because his car's rear end was spotted with lights like a theatre sign? Or because holes had to be drilled in the fenders of his new car.

How often have you driven behind a car to see its stop signal blaze out in the most unexpected place? Your eye was on the tail-light and you almost bumped.

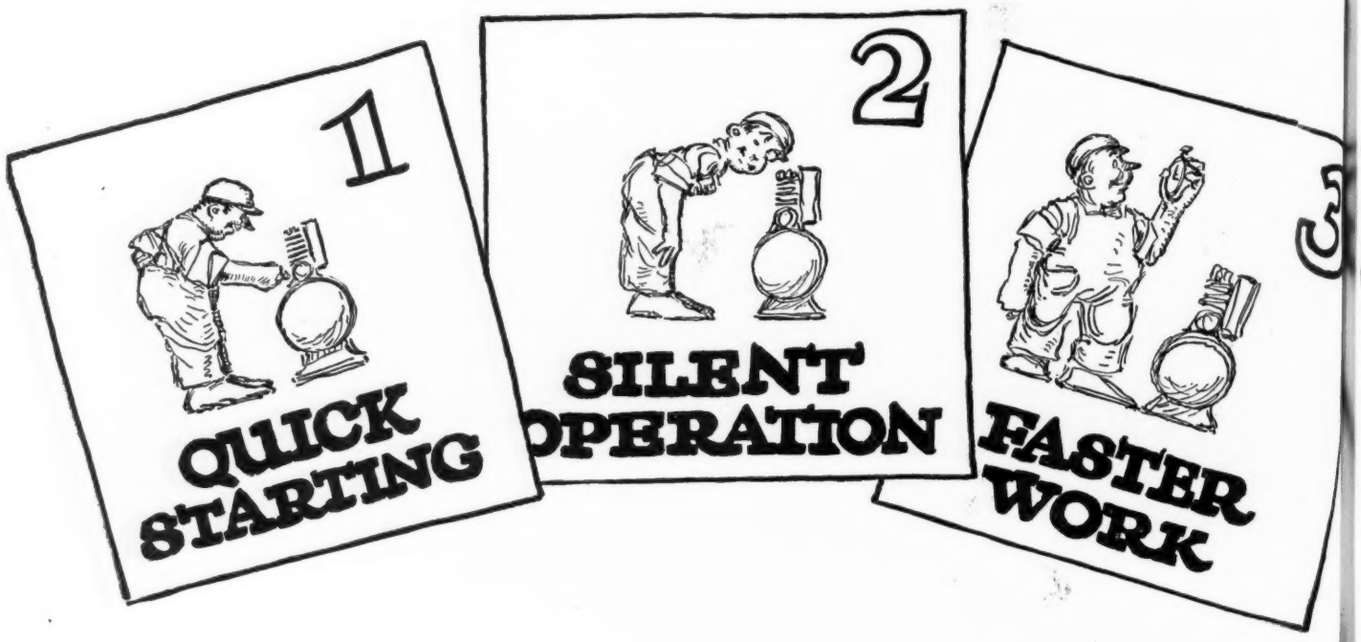
Every one of those questions is a reason for selling the AGATE; a reason for AGATE'S daily growing popularity. It is a reason for the fast turnover that piles up a big profit by the time the bill is due.

AGATE clamps over the tail light. No drilling, bolting or riveting. Made of brass and aluminum, it cannot rust; **guaranteed switch.** The wide openings provide illumination for the license plate.

Get a supply of AGATE Stop Signals and a display. Set them to work NOW.

Sales Dept.
C. N. AND F. W. JONAS
Chicago, Ill. Los Angeles, Cal.

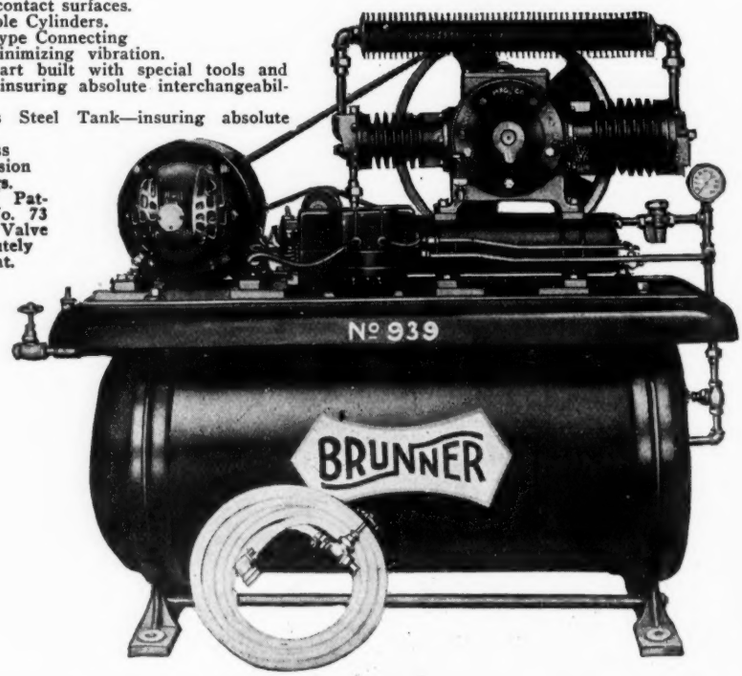
Manufactured By
AGATE AUTO APPLIANCE CO.
1721 Park Ave., Chicago, Ill.



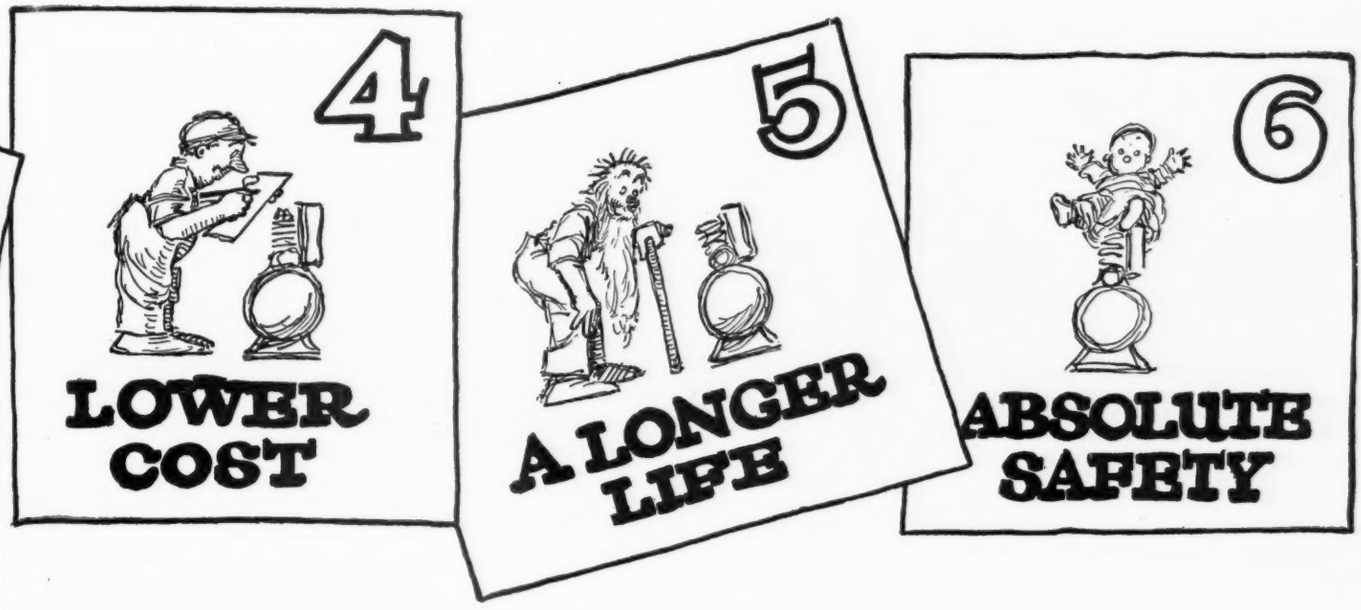
Every reason in the world f

2-Stage
1924 Model

With 20 exclusive features, a few of which are:
Extra large intercooler.
Improved Belt Tightener.
Ground contact surfaces.
Removable Cylinders.
Forked-type Connecting Rods—minimizing vibration.
Every part built with special tools and gauges, insuring absolute interchangeability.
Seamless Steel Tank—insuring absolute safety.
Solderless Compression Couplings.
Brunner Patented No. 73 Safety Valve—Absolutely Air Tight.



There is a Brunner to fit the particular needs of every garage or service station. All models described in catalogue. Write for your copy.



for buying a Brunner

PASTE this in your hat. You can no more conduct your business efficiently and economically — and thus secure to yourself its full measure of profit—without a good air compressor than you can carry on without the proper equipment in tools.

But "a good air compressor" doesn't mean any old shaky contraption that happens along. Likewise the "buying of a good compressor" doesn't mean surrendering to some glib tongued salesman who promises everything but proves nothing.

An air compressor certainly involves a sufficient outlay of money to warrant its more intelligent selection and to justify the comparison, point by point, of all the makes that are offered.

If you start comparing you will invariably turn to Brunner, for in the Brunner you will find a machine which represents unrivalled quality in every detail.

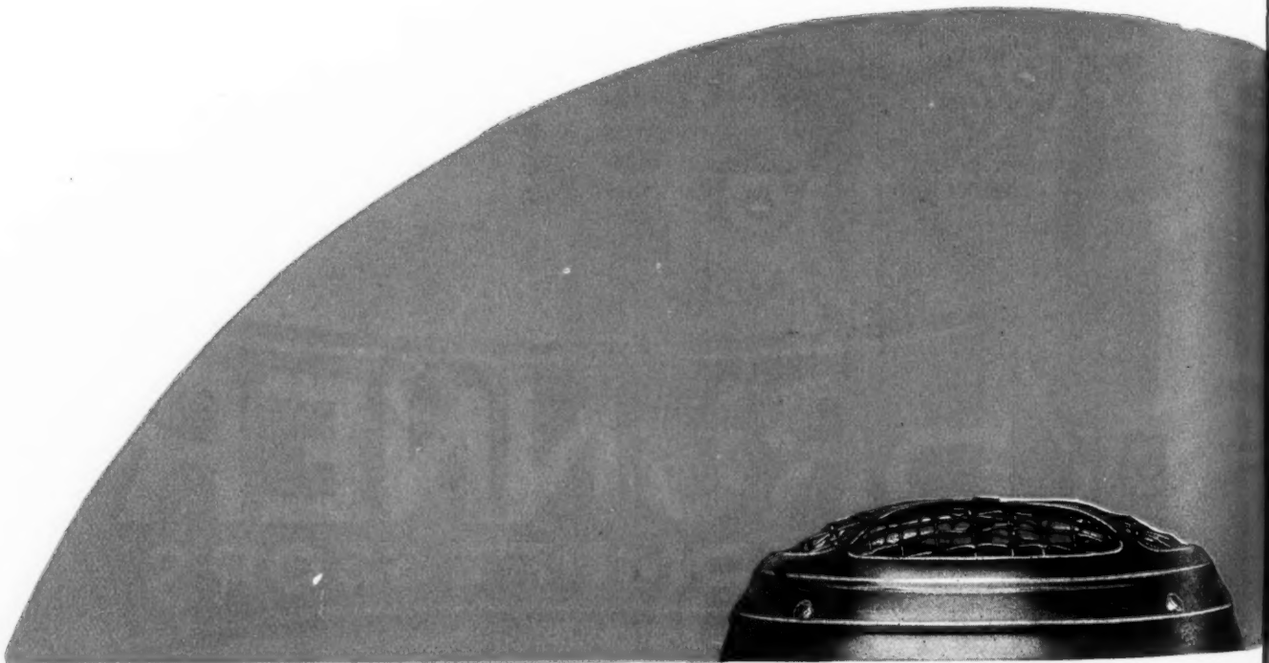
Built of the finest materials by the largest and oldest manufacturers of garage Compressors, in a plant where every safeguard is set up to insure close fitting parts and accurate contact surfaces, the Brunner naturally gives the very longest life of trouble-free service.

There is every reason in the world for buying a Brunner. Ask your jobber to prove the six points shown above.

BRUNNER MFG. CO.
UTICA, NEW YORK
Branches: Cincinnati, Kansas City, San Francisco.

BRUNNER
AIR COMPRESSORS

WATCH FOR



THE DAWN

An opportunity for a new profit is about to dawn.

New revenues came to the men who first took advantage of electric lights, speedometers, starters, four-wheel brakes, balloon tires.

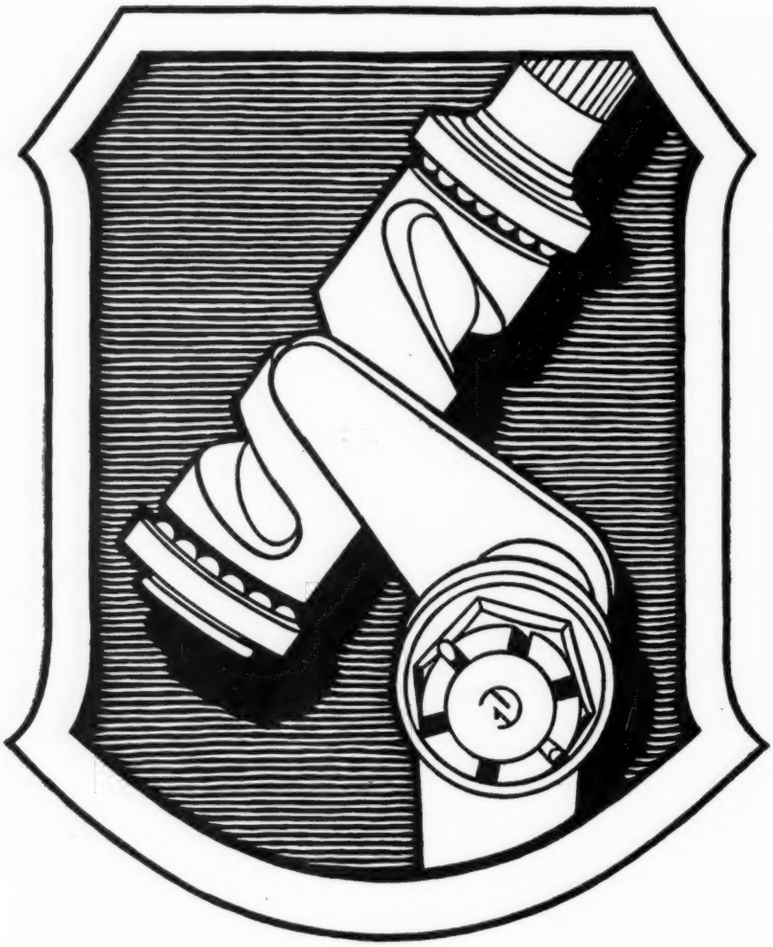
Just such another advanced improvement has been made.

When engineers responsible for such motors as those of Franklin, Rickenbacker, Chrysler, Elgin, Buda, Waukesha, (to name but a few of many) adopt a device, its merits are unquestionable.

The opportunity to sell that device for engines not so equipped is too good for any automotive wholesaler or retailer to miss.

He profits most who acts first.

Therefore address Box 6103, care Motor Age, 5 S. Wabash Ave., Chicago, asking how to get this new profit.



LEVERAGE GIVES CONTROL

STEERING of motor vehicles is revolutionized by the Ross Cam and Lever Steering Gear. When you turn the steering wheel, you rotate the cam. The cam, in turn, actuates the lever—where your strength is enormously increased as it passes into the steering arm. No wonder Ross steering is easy! Ross leverage produces this remarkable result.

But this is not all. The cam and lever, which transmit energy downward, likewise serve as a barrier to the jars, jerks and jolts of the road, as they attempt to travel back to the steering wheel. Road-shock practically vanishes. And, the unique variable pitch of the cam adds still further to your ease and control, both on turns and straightaways. Ross means absolute confidence in steering. Write for full information today.

THE NEW WAY OF STEERING

ROSS GEAR AND TOOL COMPANY, *400 Heath Street*, Lafayette, Indiana

ROSS

CAM *and* LEVER STEERING GEARS

EASIER STEERING LESS ROAD SHOCK

INSHIELD

TRADE MARK REGISTERED U.S. PAT. OFF.

DRIVING LIGHT

No Glass to Cut!

* *

No Special Tools Needed!

* *

Entire Lamp Inside Windshield!

* *

The only back-fire on jobber and dealer from the sale of an Inshield driving light is the new business that comes from the friends and acquaintances of the happy car owners who are driving with an Inshield.

No time or profit is wasted in putting the Inshield on the car. Anybody can attach it in five minutes. No special tools required.

The windshield glass is never endangered. The Inshield fastens onto the windshield frame. There is no strain on the glass at any time during installation or when in use.

You can put the Inshield anywhere on the windshield that the car owner wants it. It works equally well everywhere. It swings with the windshield to any angle.

It's easily removed for use as a trouble lamp. It can easily be removed and attached to a different place on the windshield without leaving unsightly scars.

Quality is a predominant Inshield feature. All Inshield driving lights are made of sheet brass heavily nickeled or enameled. All are fitted with 21 candle power precision tipless mazda bulbs. All have genuine silver reflectors. Bulb or lens can be changed without taking the light apart.

Sold through the legitimate jobber only. Absolutely guaranteed.

Genuine Inshields made only by

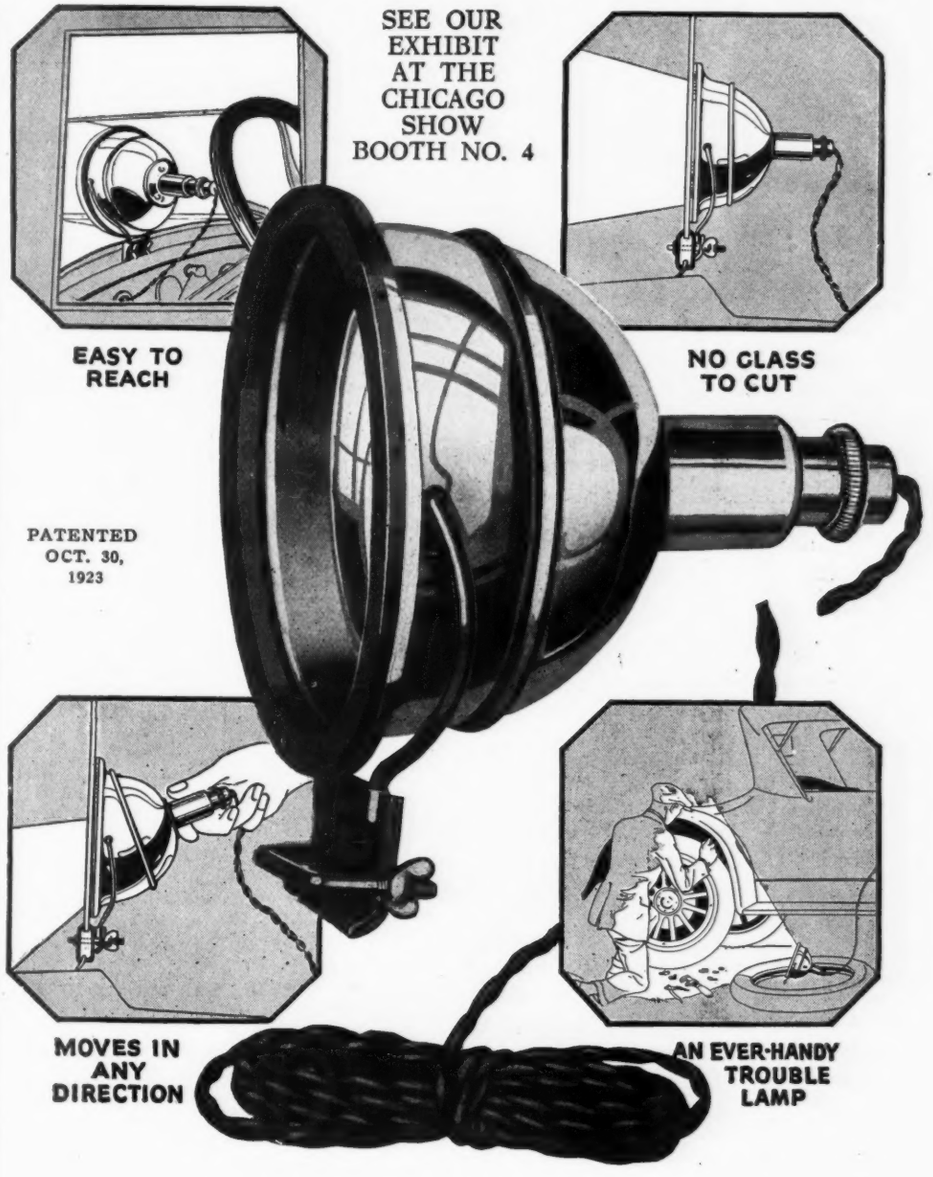
THE INSHIELD PRODUCTS COMPANY

Dept. 7

TOLEDO, OHIO

Formerly The Thal & Bitter Machine Company

SEE OUR EXHIBIT AT THE CHICAGO SHOW BOOTH NO. 4



In Two Popular Fast-Selling Models

INSHIELD SENIOR

Heavily nickeled, 5½ in. in diameter. A beautiful light. The popular number for the big cars—

$10.00

INSHIELD "8"

In nickel or baked-on black enamel. 4½ in. in diameter. Fits any car—

$7.50

Wood-Frame Bodies Are Permanently Enameled At 400° In 7½ Hours

A Simple Baking Method That Is Revolutionizing New Car Production

THE first step is the coating of a wood frame with Oxvar cement and baking to 200°.

The second step is the attaching of the metal panels of the body in the usual way to the treated frame.

The third step is the flowing on or spraying on of Oxvar enamel and the baking of the entire body at 400°.

The number of coats applied at 400° is determined by the depth of finish desired. For medium or low-priced cars three coats prove to be ample.

No "rough-stuff." No glazing, except on defective metal. No pumice rubs. Only one water sanding.

The total time required is 7½ hours. The Oxvar materials cost no more than good paint and varnish. The oven equipment required is exceedingly small in proportion to the production accomplished.

The result of the Oxvar Method is a lustrous, steel-hard finish which lasts as long as the car—obtained at a total cost which is less than half the cost of finishing by customary paint and varnish methods.

Another result of importance is that the treated frame becomes sealed against loss or absorption of moisture, and therefore cannot warp. Also, tests prove that the wood is stronger than before treatment.

It would be difficult to conceive of a finishing method more attractive to automobile manufacturers.

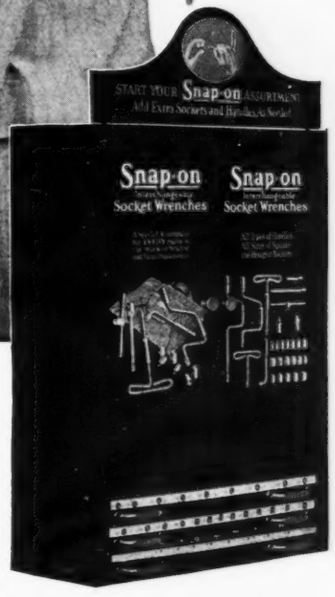
Our engineers will gladly work out for you a complete production procedure and analysis of costs as applied to 25 bodies or more per day.

OXVAR

OXFORD VARNISH CORPORATION

Main Office: Empire Building, Detroit
Plant: Toledo, Ohio

DEALERS! Here is a *Real* Socket Wrench Department



Here is the Cabinet closed—handsome, effective, compact—always ready for business. Makes many sales itself by arousing curiosity and holding interest.

See This Cabinet at These Shows

Chicago Auto Show
Jan. 26 to Feb. 2

Detroit Auto Show
Jan. 19 to 26

Milwaukee Auto Show
Jan. 19 to 26

Minneapolis Auto Show
Feb. 2 to 9

Pittsburgh Auto Show
Feb. 2 to 9

Kansas City Auto Show
Feb. 9 to 16

Boston Auto Show
March 8 to 15

Oklahoma Hardware and Implement Association
Oklahoma City, Jan. 29 to Feb. 1

Indiana Retail Hardware Assn.
Indianapolis, Jan. 29 to Feb. 1

Wisconsin Retail Hardware Assn.
Milwaukee, Feb. 6, 7 and 8

Iowa Retail Hardware Assn.
Des Moines, Feb. 12 to 15

Michigan Retail Hardware Assn.
Grand Rapids, Feb. 12 to 15

Pennsylvania & Atlantic Seaboard Hardware Association
Philadelphia, Pa., Feb. 12 to 15

Illinois Retail Hardware Assn.
Chicago, Feb. 19, 20, 21

New England Hardware Dealers' Association
Boston, Feb. 20, 21, 22

Ohio Hardware Association
Cincinnati, Feb. 19 to 22

New York State Retail Hardware Association
New York, Feb. 19 to 22

Missouri Retail Hardware Assn.
St. Louis, Feb. 26, 27, 28

Minnesota Retail Hardware Assn.
St. Paul, Feb. 26 to 29

This new Snap-on Cabinet tears down the last barrier to handling Snap-ons. Gives you a complete, convenient stock in small space, from which you can select and sell Snap-on Kits for individual cars, like the Buick Set shown above to the right. Our special book guides you in selecting kits and makes you a socket wrench expert. Write for details, or get them at any of the Shows listed at the left.

MOTOR TOOL SPECIALTY COMPANY
14 E. Jackson Blvd., Chicago.
SNAP-ON WRENCH CO., MFRS.,
Milwaukee, Wisconsin

Snap-on

INTERCHANGEABLE
Socket Wrenches

Distributing Branches:

CHICAGO, 1919 Michigan Ave.
PHILADELPHIA 1511 Fairmount Ave.
PITTSBURGH, 7232 Kelly St.
KANSAS CITY, 1933 McGee St.
ST. LOUIS, 2609 Washington Ave.
MINNEAPOLIS, 111 S. Tenth St.
RICHMOND, 519 West Broad St.
DENVER, 1515 Larimer St.
NEW YORK, 1776 Broadway.
LOS ANGELES, 1341 S. Hope St.
SAN FRANCISCO, 280 Goldengate Ave.
PORTLAND, Ore., 106 13th St.
INDIANAPOLIS, 631 N. Illinois St.
ATLANTA, 227 Spring St.
DALLAS, 312 S. Ervay St.
SEATTLE, 910 E. Pike St.
DETROIT, 4849 John R. St.

Your future profits —and Ours

When a salesman asks you to take on a line of bumpers, what does he offer? How much will his company put into it? Who takes the big chance? His company—or you?

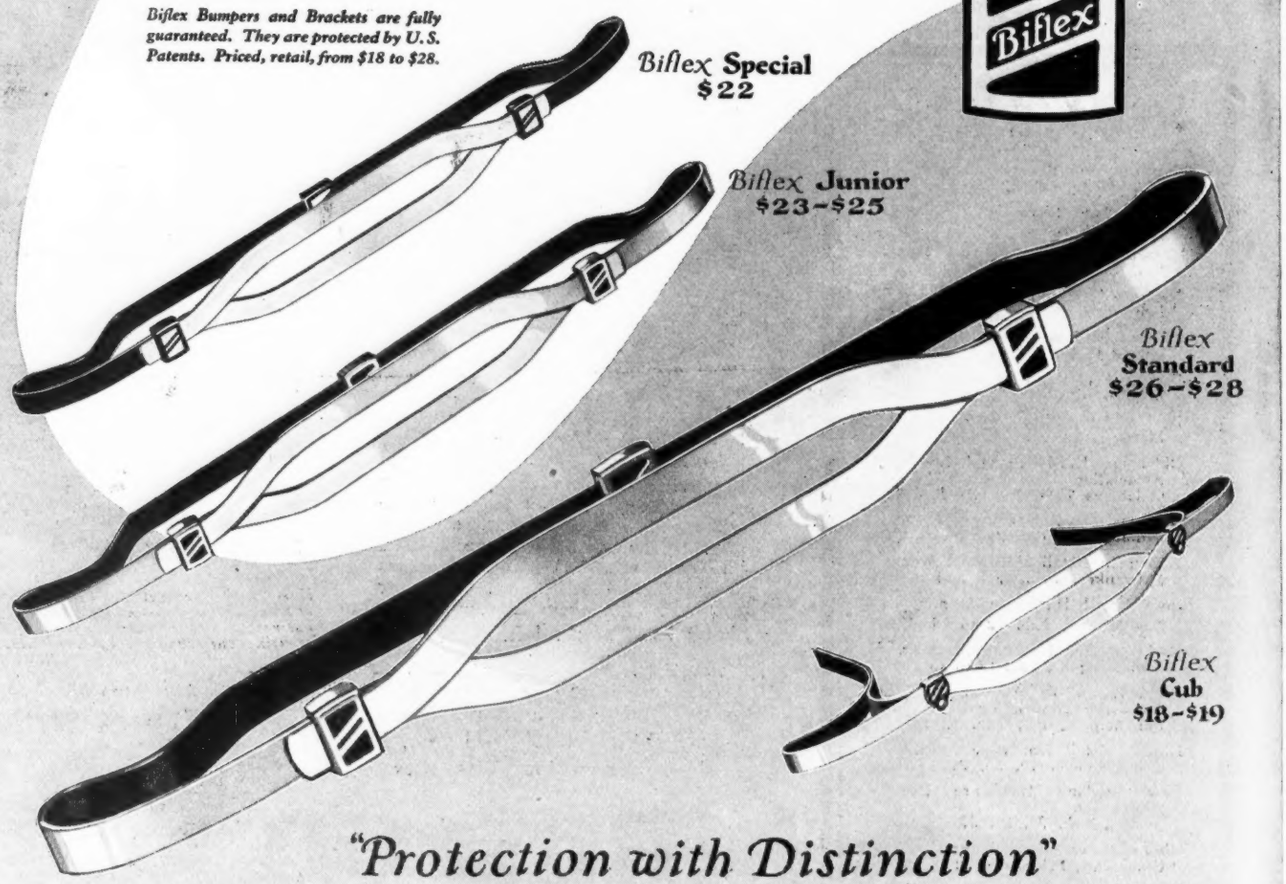
The strength of the Biflex organization is your guarantee of future sales support, future profits, continuous business year in and year out, the most rapid turnover and the widest profit margin possible in bumpers. Behind every Biflex Bumper is the Biflex plant — largest of its kind in the world. The Biflex national advertising campaign — greatest ever put behind a bumper. The Biflex organization—which changed the bumper "game" into an industry.

There is a Biflex Bumper for every car made. The original Biflex idea—a double-bar bumper with full-looped ends—still leads the world. Biflex offers you these assurances of a profitable, satisfactory and permanent connection on bumpers. You will be interested in Biflex sales and advertising plans for 1924. Write the address below.

THE BIFLEX CORPORATION
Waukegan Illinois
Export Department:
130 West 42nd Street, New York

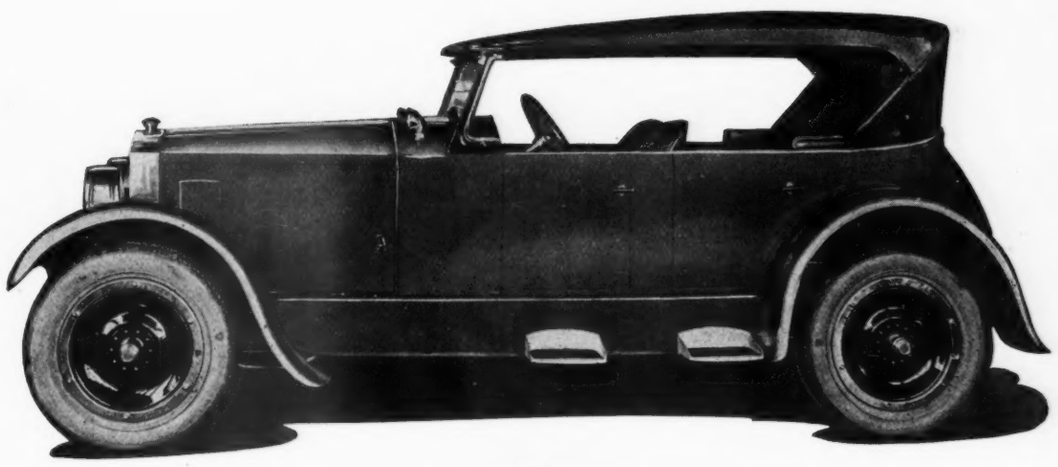
TRADE MARK

Biflex Bumpers and Brackets are fully guaranteed. They are protected by U. S. Patents. Priced, retail, from $18 to $28.



"Protection with Distinction"

Biflex Cushion Bumper



DELLING STEAM CAR
SILENCE CONTROL FLEXIBILITY
SECURITY ECONOMY

Announcing the Delling Steam Car

AN entirely new type of automobile—introducing a New Era in Automotive Achievement.

The Delling Steam Car is the result of a six years' intensive study by E. H. Delling, who designed the Mercer Four-Cylinder and improved the Stanley.

This new car combines all the excellence of chassis construction of the finest motor cars, together with an entirely new and efficient steam power plant.

The Delling Steam Car operates on kerosene (coal oil) or gasoline, or any mixture of these two fuels, and it will average from sixteen to eighteen miles to the gallon.

After Fifty Thousand Miles it will run as silently and as smoothly as it did when it left the factory.

It has a speed range of from One to Sixty Miles per Hour—all on High, as it has no transmission. Neither has it a starter, nor a carburetor, nor the conventional clutch.

Its sole controls are throttle and brakes.

Its price is approximately $2500—and it will be manufactured in Camden, N. J. The Delling Motors Company shall be glad to supply desirable dealers with full particulars regarding the car and the organization behind it. Fill in and mail the coupon.

DELLING MOTORS COMPANY
2401-2415 Chestnut St. Philadelphia, Pa.

DELLING MOTORS CO.,
2401-2415 Chestnut St.,
Philadelphia, Pa.

Please send me complete information concerning the Delling Steam Car.

Name.....

Address.....

Dealer.....

Owner.....

Set No. 412

consists of two each Nos. 402, 403, 404 and 405 C-V Tappet Wrenches. This set will take care of the adjustment of valve-tappets on 45 passenger cars and trucks. Price, east of Mississippi River in cloth-lined leatherette case, $10; slightly higher west of the Mississippi and in Canada.

A "BONNEY" WRENCH it is!

"I have a Bonney
A long hard biting Bonney
That will reach into the motor when it's hot
It will take up on ye tappet
Though it's thin ye canna snap it
Bonney's the best wrench, I've got."

Bonney Tappet Wrenches are long (8 inches), to save your knuckles from burn and bruise.

They are strong—made of that super steel *Chrome-Vanadium*. Drop forged and specially heat treated.

They are thin—to be convenient. Two can be used in one hand—like scissors—while the third, in the other hand, makes a perfect adjustment.

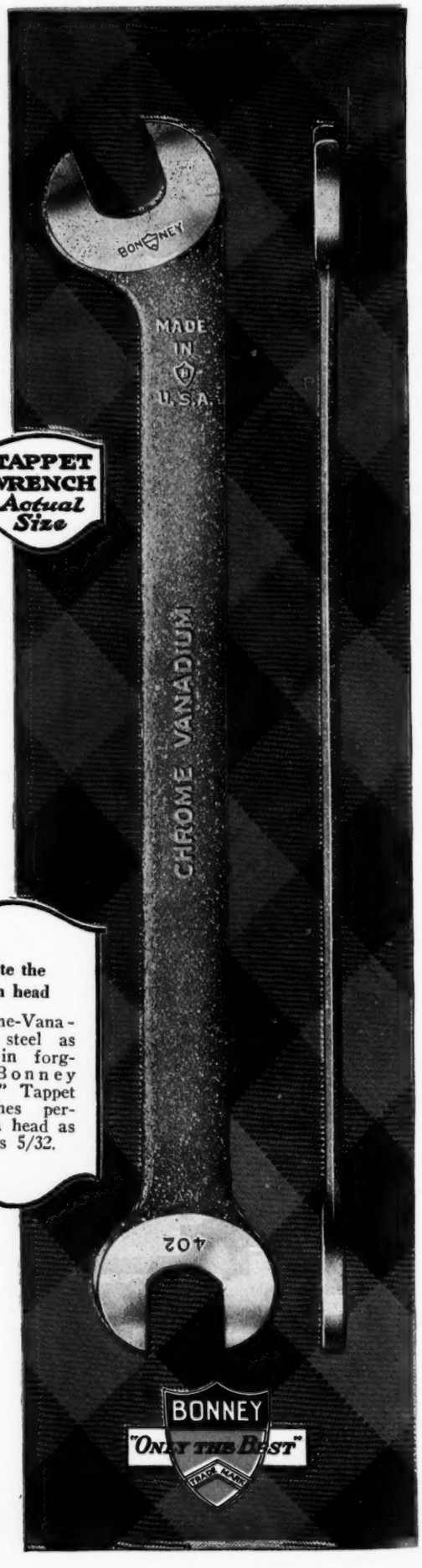
They are guaranteed—not to spread or chip.

They are listed—in catalog No. 23 which fully explains the Bonney "CV" line. Write for it today.

Made in U. S. A. by

BONNEY FORGE & TOOL WORKS
ALLENTOWN, PA.

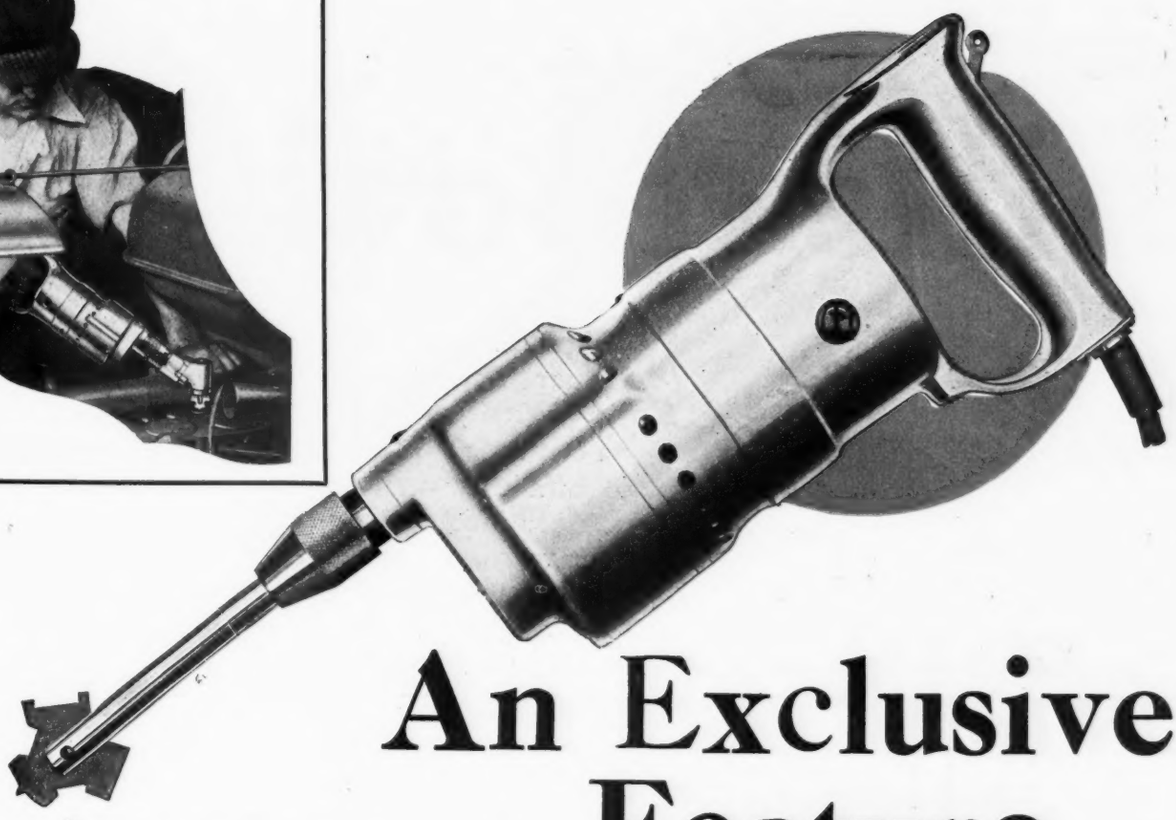
BONNEY Chrome-"CV"-Vanadium WRENCHES



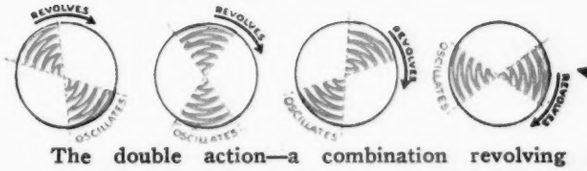
TAPPET WRENCH *Actual Size*

Note the thin head

Chrome-Vanadium steel as used in forging Bonney "C V" Tappet wrenches permits a head as thin as 5/32.



An Exclusive Feature



The double action—a combination revolving and oscillating motion—is the correct principle of valve lapping. There is no other electric valve lapper with this double action movement. The valve revolves and moves back and forth in the seat at the same time. Any mechanic can now hold the machine in one position and do expert work. The time required is only a fraction of that demanded by ordinary methods.

The Petersen Electric Valve Lapper is also noted for its ease of handling. The angle offset attachment is an exclusive feature designed especially for this tool. It permits a mechanic to reach any valve, even if it is located under a gas tank—(as shown above) or back under the dash. Any mechanic will realize at once what a great convenience this is. This angle offset attachment may be purchased at a small additional cost. Send for a miniature catalog of the complete line of Petersen Guaranteed Electric Portable Tools.

MOVES BACK and FORTH AND REVOLVES AUTOMATICALLY

PETERSEN

Guaranteed

DOUBLE ACTION VALVE LAPPER

$39

Licensed under patents controlled by Albertson & Co. Sioux City, Ia.

A. H. PETERSEN MFG. CO.

1616-24 Fratney St. Milwaukee, Wis.

"If it isn't a Petersen it isn't a Hole Shooter."

$25

¼" Drill

The original and Famous Hole Shooter

$50

½" Drill

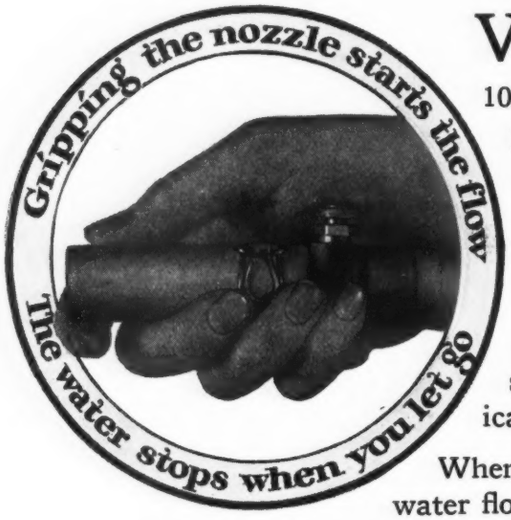
$15

Drill Press Stand for ¼" Hole Shooter

$30

Drill Press Stand for ½" Drill

are your water bills too high?



WASTED water runs up your water bills about 100%. Why pay for water you can't use? It's a bother to turn the water on and off continually. You need not worry about conserving water. Just put a Little Giant Water Saver on the end of your hose and stop water waste automatically!

When you grip the nozzle, the water flows. As soon as you release your grip—the water stops.

Nozzle of red rubber prevents scratching car. All brass construction, reinforced washers.

List price $3.00, subject to dealer's discount. Have your Jobber send you one.

Our booklet "Beating the Water Meter" is now ready. Valuable information for Garagemen and other large water users. Get your copy.

THE GAYLORD MFG. COMPANY
Paterson, N. J.

GAYLORD LITTLE GIANT Water Saver

THE GAYLORD MFG. CO.,
PATERSON, N. J.

Am interested in saving water. Send me your free booklet "BEATING THE WATER METER." You may send a Little Giant on approval to be paid for at $3.00 list less our dealer's discount of 25 per cent if we furnish you the name of our jobber. It is understood we can return the Little Giant for full credit if not satisfied any time within two weeks.

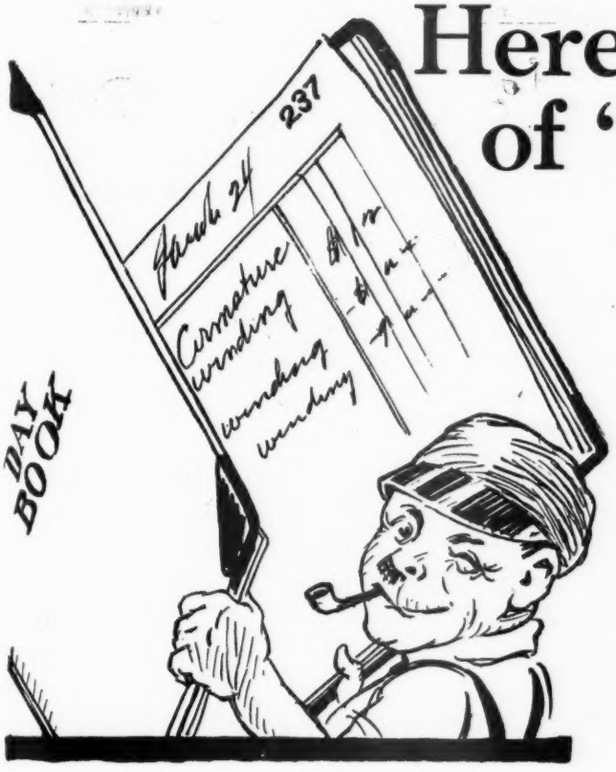
Name.....

Address.....

Jobber's Name.....

Jobber's Address.....

Here's a New Source of "Velvet" Profit

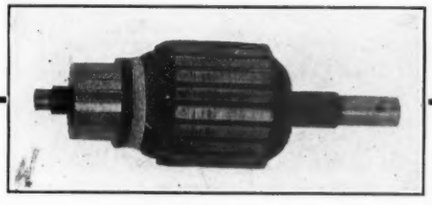


In the repair game, money made in spare time on little jobs or money made from the sale of somebody's car, that is profits acquired from sources other than regular repair or overhaul jobs, are usually considered "just so much velvet."

There is a job that many repairmen will not even touch and others take with an often resultant loss of profit, customer good-will or both—that's armature rewinding.

Our service makes it possible for any repairman to turn every rewind job he gets into "velvet". Instead of turning the job down or attempting to do the rewinding himself without the many special tools and extra equipment required he just takes bearings and end plates off and ships armature to us.

In nearly every case we ship a rewound armature to him on the same day old one is received. He puts bearings and end plates back, replaces the armature and—what's more interesting, "banks the velvet"—the difference between our bill to him and his bill to his customer. Due to quantity production, our prices to him (as shown in the price list opposite) are so low that "the velvet" represents a very fair profit. Besides, satisfaction is assured because—



PRICE LIST
Net Prices

Ford Generator Armatures	$ 1.95
Ford Starter Armatures	2.00
Any Make of Two Unit Generator Armatures	4.95
Any Make of Two Unit Starter Armature Rewound	6.75
Motor Generator	
Northeast	11.00
Simms Huff	7.00
Delco	12.00
Dyneto	12.00
Detroit	12.00
Any Vacuum Cleaner Armature	3.50

We Guarantee Every Armature We Rewind

Try Us on *your* next Rewind Job.

Our new plant just completed increases our capacity to 1500 rewind jobs a day.

H.M. FREDERICKS CO.
Armature Winding Specialists
Lock Haven **Penna.**

Double your Jack sales

The Walker Counter Display Boosts Sales—Makes Selling Easier

When Walker brought out the first Jack Merchandiser last year, over 8,500 dealers proved that it was the greatest sales stimulator ever offered. Some boosted jack sales 600%. Increases of 200%, 300% and even 400% were common.

The new Walker Counter Display can be used to even better advantage by dealers. It may be placed on a counter or in a window right where it will be a constant reminder to customers to get a dependable Walker Jack.

It will get the jack question before every customer, without taking a moment of your time. It will sell jacks for you. Five out of six motorists need dependable Walker Jacks, statistics show. Your sales field is enormous.

FREE TO DEALERS

The Walker Counter Display is free with an assortment of 10 Walker Jacks. Put it to work boosting your jack sales and saving your time on these sales.

WALKER MANUFACTURING COMPANY
Racine, Wisconsin

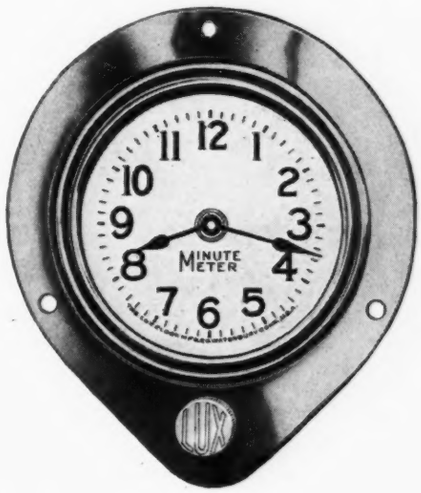
Walker JACKS

"Dependable in Emergencies"

The

MINUTE METER

The Greatest Clock Value Ever Offered the Trade



And guaranteed by one of the largest manufacturers of this type of movement.

$2.50

Radium Dial
$3.50

MINUTE METER is a dust-proof—vibration-proof—accurate clock at a remarkable price made by men who have had 40 years clock making experience.

Minute Meter fits flush on any dash—wood or steel of any thickness—quickly and securely.

To remove Minute Meter for setting and winding, just turn a knob and it comes right out. To replace—simply slip back into place—turn knob and Minute Meter is locked in again.

A great little clock at a fast selling price.

You've got to see this little clock to appreciate it. Send in an order now.

Minute Meter is packed in a neat little carton. Use the platform of carton for pattern to cut dash—insert three small bolts and Minute Meter is on to stay.

This attractive little counter display stops 'em—and the price settles it. $2.50. What a bargain!

***The* LUX CLOCK MANUFACTURING CO., INC.,**

105 Sperry Street, Waterbury, Connecticut, U. S. A.

"There's A Good Place"

When the old gray mare lost a shoe or the buggy needed repairs there was an insignia on the village street that the driver looked for at a distance. But times have changed and the big wooden horse shoe is as rare as the cigar store Indian.

The development of automobiles and efficient business methods brought about the now familiar curb gasoline pump. The first curb pumps built by Gilbert and Barker were not intended to "stand there like wooden Indians" but to SELL gasoline. Today Gilbert and Barker gasoline pumps stand at the curb everywhere.

They give speedy, safe, absolutely accurate measure and lasting service.

The curb pump is the first installation required by a garage or service station in order to do business. It is the insignia that the modern motorist looks for at a distance whether it is gasoline he wants or anything else automotive. It indicates the nature of your establishment—*a modern insignia of a modern business.*

GET OUR 1924 PRICES BEFORE BUYING. THEY WILL INTEREST YOU

GILBERT AND BARKER
MANUFACTURING COMPANY
GASOLINE AND OIL STORAGE EQUIPMENT
SPRINGFIELD, MASS.

A "Mule" for Wear and Sure-footedness

This is No. 13 Fits Many Cars

Rives Neverslip Pedal Pads *for all cars—*

If *you've* ever used 'em on *your* pedals, you don't need to be told anything about the comfort and safety which they contribute to your driving.

If you've ever *sold* 'em, you don't need to be told anything about the demand they enjoy, and the way they help to build up sales and profits.

BUT, if you happen to be one of the drivers who have gone along with their soles in contact with hard, vibrating, heating iron pedals, instead of providing for yourself the comfort and safety of these long-wearing Rives (pronounced Reeves) rubber pedal "cushions," there's a *real* treat in store for you.

THEN, after this self-demonstration as a driver, you'll be enthusiastic and eager, as a dealer, to show them to your customers. *Rives Neverslip Pedal Pads Sell Readily and Profitably.*

Six Styles Fit 92% of All Cars

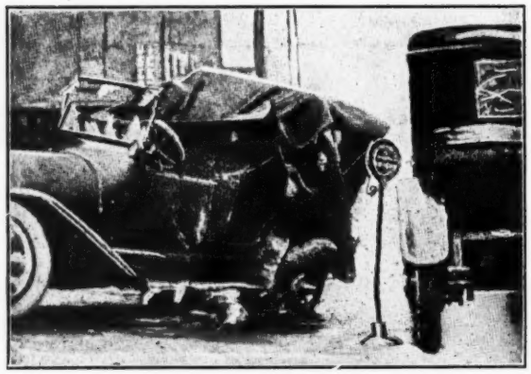
Rives are standard factory equipment at present on twenty makes of cars, and have become standard "driver necessity" on thousands of others. Be sure to *make* sure that you use and sell the original and genuine—that's *Rives.*

Write us about our unique "dealer-sales-aid" plan, which includes the new, impressive, sales-making counter or window display card. If your jobber doesn't carry Rives, write us direct for full-line information. Rives, is a fast-moving favorite.

GEO. H. RIVES MFG. COMPANY, Inc.

P. Q. Wray, *President*

1468 S. Michigan Avenue, Chicago



His foot slipped off the pedal!

Dealers don't have to be educated up to the *need* for pedal pads—they *know* they're necessary.

New Accelerator Extension

Gives ease and comfort to driving. Brings the accelerator nearer the foot in ANY position. Prevents slipping. Rests the sole of the foot. Fits all cars and sells readily for $2.00. A much needed utility.

What the dealers want is a complete line—priced right with discounts that net a *substantial profit.*

With twelve sizes of "Perfection" Pedal Pads, you can equip any car made during this and the past SEVEN YEARS. This means small stock—quick turnover—bigger profits because our discounts are exceptionally liberal.

Our complete line consists of Extension Pedals, Accelerator Extensions, and special pads for every make of car.

No bolts—no drilling—just bend the prongs and "Perfection" Pads are on to stay.

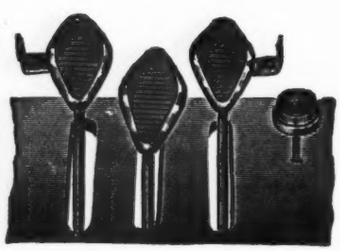
We have a special proposition to offer on quantity orders. Better send for our catalog and discounts *now.*

Manufactured exclusively by:

AUTO PEDAL PAD COMPANY
318-320 West 52nd St. New York City

Universal Extension Pedal

This pedal fits every shape or type of automobile brake and clutch. It is invaluable for cars driven by several people, as it adjusts quickly to suit the individual driver. Price, $5.00 per pair.



The New "D" Hook for Ford Cars

Provides a comfortable rest for the foot and relieves muscle tension. Attaches without bolt or drilling—just bend the prongs. A great convenience and a rapid seller in a big market. $1.00 per set.

This Display Board, Accelerator and Starter Pads, 12 Assorted sizes, $6.00.

These pads are made in sizes to fit accelerator or starter for every make of car. Strong, well designed, heavy rubber pads set in a nickel frame. Makes control of the throttle easier and more certain. Price, 50c each.

"Perfection" Pedal Pads

"Insist on the Pad With the Nickel Frame"

ANTI-RUST GUARANTEE
If any rust appears on the Nickeled Rail of this Bumper within 5 Years from date of purchase, as indicated below, it will be instantly replaced with a new Rail free of charge upon presentation of Bumper and this tag to dealer from whom purchased or from the manufacturer direct.
THE CHURCHVILLE MFG. & LABORATORIES CO.
Sole Mfrs.
THE WHARTON CUSHION GUARD RAIL
Date Sold.....
.....(to be filled in by dealer)

This Guarantee Attached to every Wharton Cushion Guard Rail

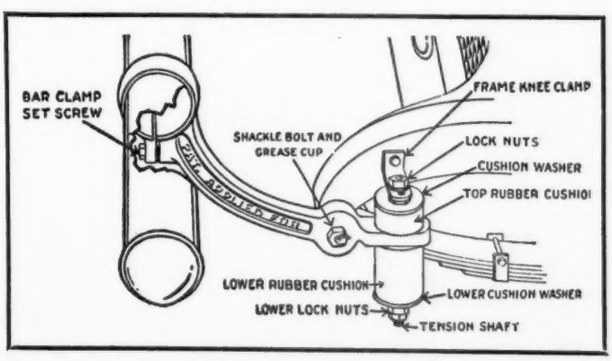
Never Before —Such a Guarantee —Such Sales Possibilities!

You can now offer your customers a bumper of distinctive beauty with exclusive shock-absorbing features and unconditionally guaranteed for 5 years against rust.

There are no strings to this guarantee. The highly polished rail is specially processed before nickel-plating to prevent rust. If a single spot of rust appears within 5 years from date of sale we replace rail with a new one free of charge.

Think of the sales value of this guarantee to you. A new car owner can buy a Wharton Cushion Guard Rail knowing positively that a rusty bumper will never be one of his sorrows.

A Wharton Rail will enhance the appearance and materially increase the resale value of a used car.



All Car Owners are Good Prospects

Besides enduring good looks the Wharton Cushion Guard Rail offers real **Shock-absorbing** Protection. It is fitted with lever brackets which contain powerful rubber cushions, as shown in the diagram. In case of a bump the shock has to work through the resistance of the leverage to the resilient rubber cushions. It is gradually absorbed. When it reaches the car it is reduced to a minimum. No violent rebound results.

Only the finest materials are used in the Wharton Rail, installation is simple, there are no holes to drill—and it costs but little more than the ordinary steel bar bumper.

We have a very attractive distributor's proposition to offer dealers. To Jobbers our terms are liberal. Write.

The Churchville Mfg. & Laboratories Co.

246 N. 17th St., Philadelphia

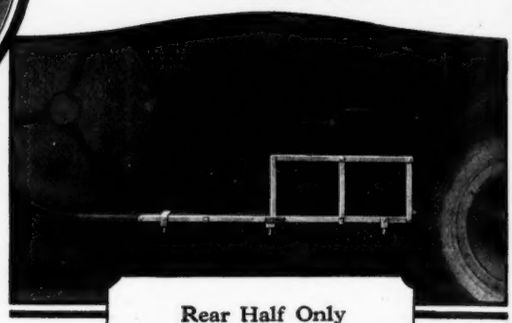
Made in two sizes:

No. 1—DeLuxe Type, 3 inch Nickel Rail and Black Brackets	$30.00
No. 101—DeLuxe Type, 3 inch Nickel Rail and Nickel Brackets	35.00
No. 2—Junior Type, 2½ inch Nickel Rail and Black Brackets	28.00
No. 202—Junior Type, 2½ inch Nickel Rail and Nickel Brackets	33.00
Special Shackle Bolts ..... each	.75

Kales BagRack

$3 For Small Cars
No. 45—45″ Long

$4 For Large Cars
No. 56—56″ Long
West of the Rockies 3.50 and 4.50



Rear Half Only

A Baggage Rack That's RIGHT

Fits on Edge of Running Board
Out of sight but Always Ready

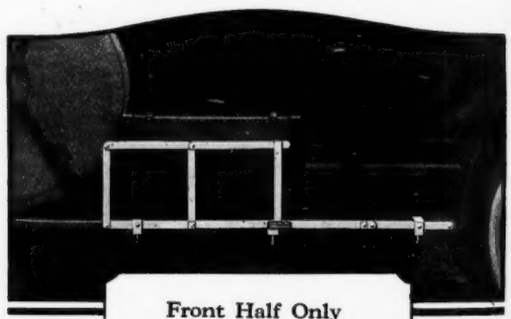
Either Half can Be Used Separately
Giving easy access to doors

DOES NOT RATTLE
Held firmly in place—open or closed

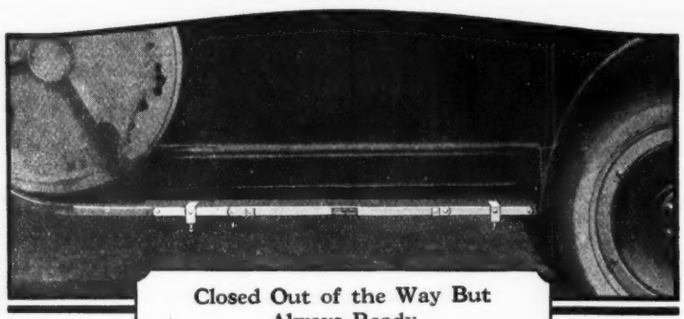
Lasting Finish
Best Enamel finish—no cracking

Hard to Steal
Clamps firmly in place—can be bolted permanently

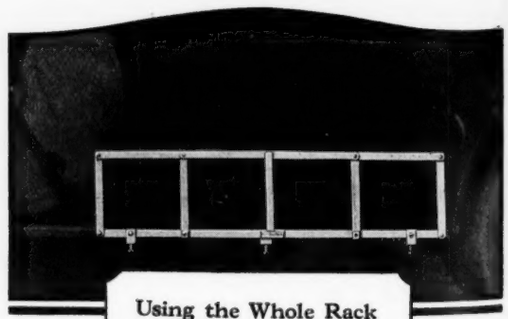
Useful for-Touring - Shopping - Camping-Tradesmen - Salesmen - Workmen



Front Half Only



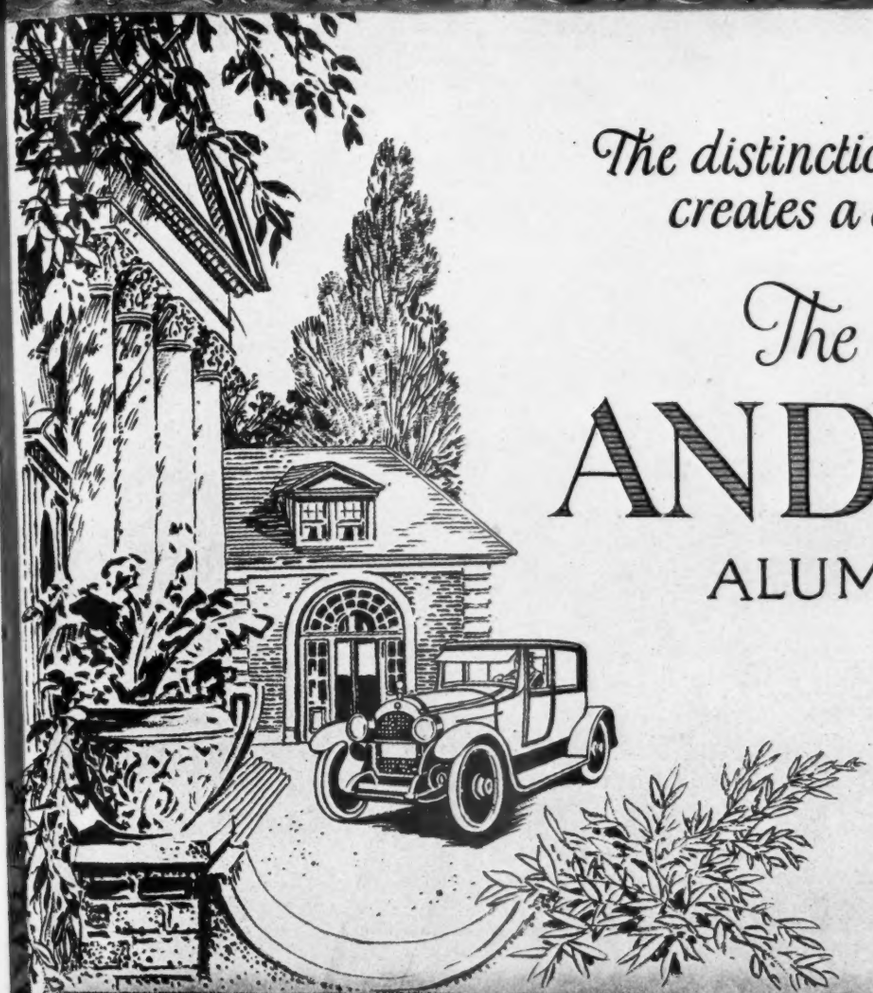
Closed Out of the Way But Always Ready



Using the Whole Rack

Kales Stamping Company

1673 W. Lafayette Blvd. Detroit, Michigan



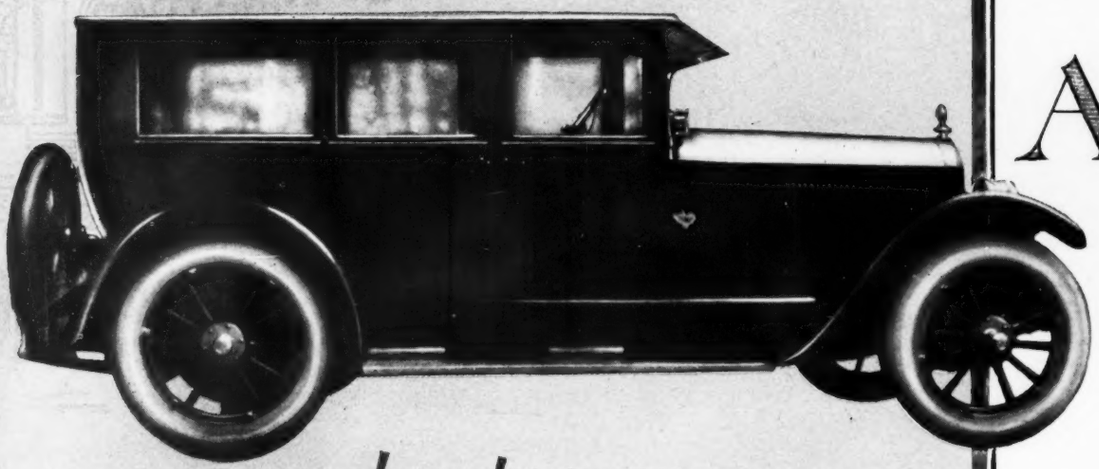
The distinction which invariably creates a desire for possession

The Coachbilt ANDERSON

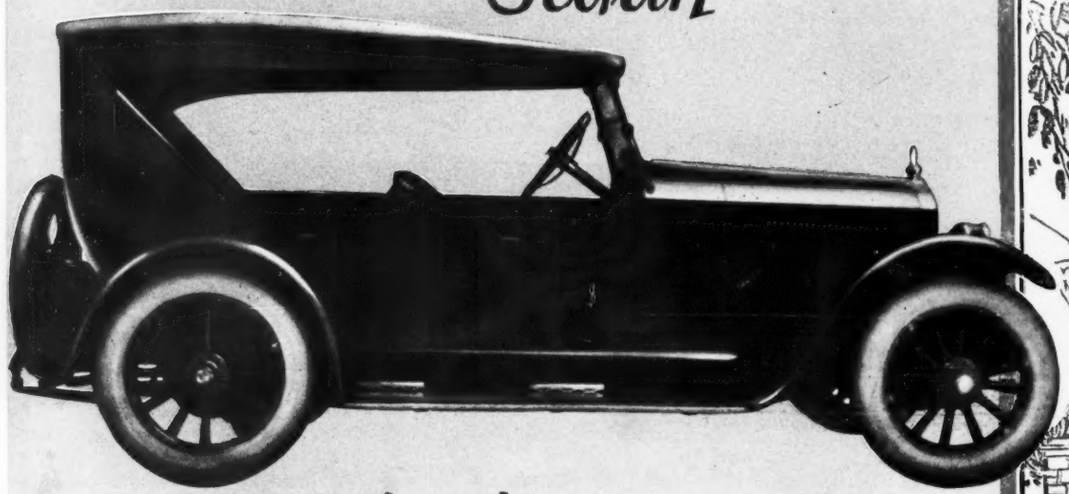
ALUMINUM SIX

Anderson's Coachbilt Automobiles are manufactured where working conditions are ideal ~ There is contentment and happiness among these master craftsmen who take pride in living up to the fine traditions of five generations of fine coachbuilding

Six
ANDE



Standard Sedan



Standard Touring

Sport Touring

FOR many years
derson has been
ufacturing motor
under conditions wh
may well be consid
ideal. It is not unim
tant to state that the
who actually build t
automobiles are unh
ried, take a keen pride
what is to them, a
ambition, and who
in the majority of c
artisans reated in the
mosphere of the most
pert and painstak
coachwork. Their fat
before them were with
loyal and enthusiasti

The ANDERSON
therefore, produced
manner which is never
highly commercial
Every individual car

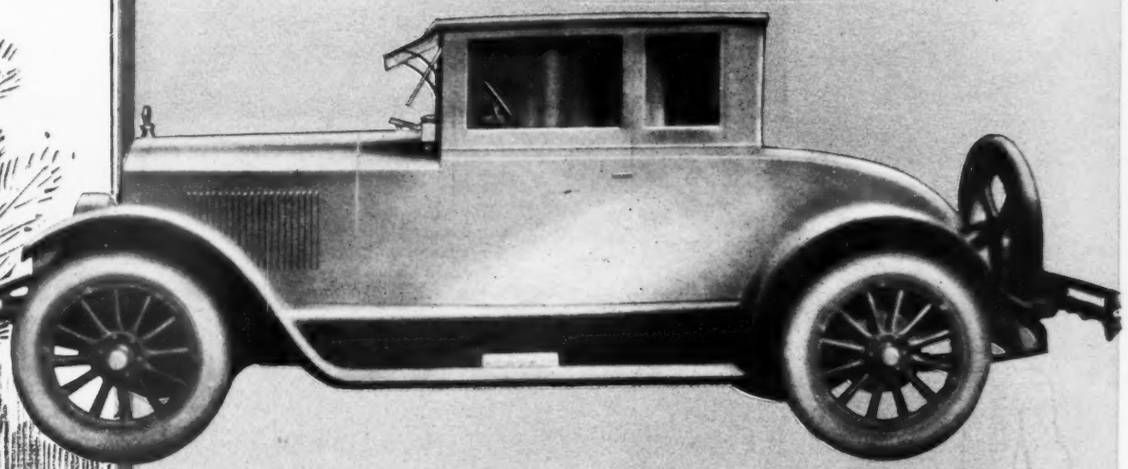
These Models will
on display at the N
York and Chica
National Shows.

Coachbilt
RSON
Models

PERFECT thing, bearing the unmistakable mechanical imprints of the affection and the skill which have gone into it. If ever there was an automobile surrounded by fine traditions, that automobile is The Anderson. It could not fall short of superior excellence, because of the spirit which brings it to life.

And the owner of an Anderson immediately becomes conscious of much of this same pride, coupled with unbounded confidence, an intensely personal joy of ownership. The innumerable reasons for this are to be found in the car itself—long, long after it has registered record mileage, as well as from the very first day.

Coach



Coupé

Sport Sedan

These Models will be on display at the New York and Chicago National Shows.

Yes!

Out-performs any car in its class—*Sells for* $895

The enthusiasm which greeted the Gardner cars at the New York Show will undoubtedly be duplicated at Chicago and all the other big shows.

That same enthusiasm can be duplicated in your own salesrooms. The Gardner car will bring hundreds into your place.

You will have the thousands of Gardner owners helping you sell more Gardner cars. They are satisfied. They are enthusiastic.

For $895 you can sell the car with the famous five-bearing crankshaft Gardner motor which reduces vibration to a point so low it is imperceptible.

$100 lower in price

***now* $895**

GARD

For $895 you can sell the car which accelerates from 5 to 25 miles an hour in 7.7 seconds; and which ranges from 2 to 60 miles an hour in high gear.

For $895 you can sell a car so durable and economical that repair parts have cost less than a dollar a car a month on all Gardner cars built.

Gardner cars give you a complete line on a single chassis.

You want this contract

More than 1,100 dealers are making money with the Gardner car. We want more dealers.

Our contract is a fair, safe contract in plain English on one page. The discount is big. The company behind it is financially sound and has more than 40 years of manufacturing experience.

You can build a steady, sound business with the Gardner car selling economical transportation.

You owe it to yourself to write or wire for particulars.

The Gardner Motor Company, Inc., St. Louis, U.S.A.

At the Show

See the Gold Chassis and the complete line at the show

OFFICIAL SHOW HEADQUARTERS: CONGRESS HOTEL

N E R

Learn the Facts at the Shows

Smaller investment, quicker turnover, satisfied and enthusiastic customers mean more profit and healthier business growth. That's exactly what the McKay franchise is giving accessory dealers in every part of the country.

It will pay you to investigate this profit opportunity. Talk to the men in the McKay exhibits at the National Automobile Shows. We will exhibit at

Chicago Show—Space 99

If you're not going to the shows, write for the facts at the address below.

McKay Tire Chains—the Better Black Chains in the Red Band Bag. One short line of sizes meets every motorist's need—no necessity to carry duplicate lines. McKays cost no more in the first place and cost less in the end because they last longer.

McKay Shurout Chains—meet every bad-road emergency. They'll provide traction anywhere, serve as a tow-line, lock for spare tire, temporary repairs or as emergency tire chains for trucks. Shurouts are as much a necessity as a jack or tire pump, and they are the only chains of the kind on the market.

McKay Ready Repair Links—for the instant repair of broken cross chains, without tools. Sold twelve in an envelope, twelve envelopes in an attractive display carton.

Don't pass up the profit opportunity the McKay line offers you. Write for the facts today.

UNITED STATES CHAIN & FORGING COMPANY
Union Trust Bldg., Pittsburgh, Pa.
Makers of Complete Lines of Chains for All Commercial and Industrial Purposes
Plants at York and McKee's Rocks, Pa.; Columbus and Marietta, Ohio; Huntington, W. Va.

McKAY TIRE CHAINS

McK

Have you tried this plan?

—keep one Reliable on the counter and the rest where the customer can see them

"The greater the number of customers who handle a Reliable Jack on my counter, the more sales I make," reports one progressive dealer. "I always keep one Reliable on the counter and the rest of my supply in plain view."

Have you tried this plan of selling more jacks? Give it a trial today—one day is enough to convince you.

Customers always like to handle things which are left on the counter, so why not cash in on this habit and let them play with a Reliable Jack? When they are handling the jack, you can "ask 'em to buy."

Lots of times a customer is in need of a good jack, but has put off buying it or has forgotten about it. A Reliable on the counter will remind him of his need, and the chances are he will buy the jack then and there.

Reliable Jacks Sell Themselves

If your customer doesn't want the same size jack as you have on your counter, show him the other Reliables on your shelves. The No. 9 for light cars —the No. 46 for heavier cars—or the new No. 5-A with its 34-inch detachable folding handle. It will be easy to sell him one of these good jacks.

* * * *

Over 5,000,000 Reliable Jacks have already been sold. Are you getting your share of the profits of the sixth million? Write for our catalog and price list and get started now.

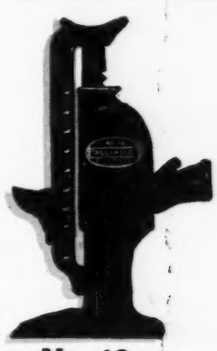
Elite Manufacturing Company, Dept. MA-1, Ashland, Ohio

Northwest Branch—G. A. Ashton Co., St. Paul, Minn.
(Complete stock carried in Ashton Building.)
Southwest Branch—Carroll & Co., Dallas, Texas.
(Complete stock carried in Carroll Warehouse.)

REPRESENTATIVES:
Motor Products Co., 149 Church Street, New York.
L. E. Spencer Co., 704 Stahlman Building, Nashville, Tenn.
A. E. Mohrig, 1454 Pine Street, San Francisco, Cal.

No. 5 A

No. 9



No. 46

RELIABLE JACKS

Double-acting thrust bearing, flat seats (grooved races) 2100-F Series

Single-acting thrust bearing, flat seats (grooved races) 1100-F Series

Single-acting, self-aligning thrust bearing 1100 Series

Single-acting, self-aligning thrust bearing, leveling washer. 1100-U Series

Double-acting, self-aligning thrust bearing, leveling washers 2100-U Series

"How much power should we lose in transmission?"

An automotive engineer reported to us that in his car too great a loss was shown between the power plant and the wheels as compared with tests made on the block.

"How can I avoid this?" he asked. "The lost power causes a lack of quick responsiveness, a loss of speed when running, inability to negotiate high grades, and results in high operating cost."

We examined the blue prints and specifications. Found that in many locations ball bearings should have been specified. We suggested necessary changes.

"You've cut down my loss of power more than 50%," the engineer advises us. "This has almost doubled the speed of the pick-up, reduced gasoline consumption and given me plenty of power for hills."

These are every day problems solved by our staff of engineers experienced in minimizing friction and increasing efficiency of power plants.

Whatever your power transmission problems may be, tell them to us. STROM ball bearings are made with the precision of watch parts. We keep a full stock of standard sizes and styles on hand at all times. Your emergency call will be given prompt attention.

We want you to look upon us as part of your engineering department.

Write us.

Strom BALL BEARINGS

Manufactured by

U. S. BALL BEARING MFG. CO.

4551 Palmer Street

CHICAGO, U. S. A.

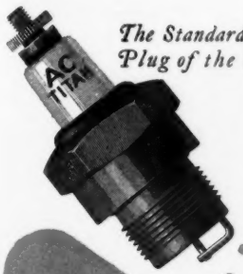
Single-row deep-groove Standard type, radial bearing

Double-row, deep-groove Standard type, radial bearing

Angular contact bearing, combination radial and thrust

Double-row, maximum type, radial bearing

Single-row, maximum type, radial bearing



The Standard Spark Plug of the World

More than 85 per cent of all cars and trucks produced in this country, Fords excluded, are factory equipped with AC Spark Plugs. Among these cars are:

Buick	Hupmobile
Cadillac	Jewett
Chalmers	Jordan
Chandler	LaFayette
Chevrolet	Marmon
Chrysler Six	Maxwell
Cleveland	Nash
Dodge Brothers	Oakland
Dort	Oldsmobile
Durant	Paige
Essex	Peerless Six
Hudson	Star

Yellow Cab

This tremendous, ready-made market for AC's is right at your door and will always be there in ever-increasing size.

There is a type and size for every motor

The best known, easiest selling and most profitable spark plug.

AC Spark Plugs are a safe investment because they are backed up by the factory equipment business of more than 200 manufacturers, and by strong national advertising which creates a big demand for them not only from the owners of AC-equipped cars, but from the owners of other makes as well.

Every day the demand for AC grows larger.

The AC 1075 for Fords is a big seller because it is a better plug for Ford engines—it satisfies the owner and makes money for the dealer.

SPARK PLUGS SPEEDOMETERS

The accurate, easily installed Ford Speedometer can be sold to every Ford owner

AC Spark Plug Company, FLINT, *Michigan*

Makers of AC Spark Plugs—AC Speedometers

U. S. Pat. No. 1,135,727, April 13, 1915. U. S. Pat. No. 1,216,139, Feb. 13, 1917
Other Patents Pending

THE SATURDAY EVENING POST

The timing gear train is located in front of the motor, just back of the radiator, as shown in the drawing. The greater percentage of motor noise can be traced here when all timing gears are metal.

A Textolite silent timing gear train. Note that contact between gears is from steel to (non-metallic) Textolite to steel. This eliminates the grinding and clashing—the greater percent of all engine noise.

Cross section of a Textolite camshaft gear showing exclusive construction. The flexible-web, composed of fabric layers impregnated with a chemical gum—pressed hydraulically into shape and cured—it is not mutilated and weakened by machining. The comparatively thin web of a Textolite gear allows flexibility of rim and quick recovery from shocks and takes up the lash and whip—the destructive vibration of the motor. Laboratory and road tests show that Textolite gears actually double the life of your engine.

Permit Us to Show You the Way to Longer Engine Life

REGARDLESS of the make of your car—you should know why the largest producers of high grade motor cars in 1923 have equipped their new models with Textolite silent timing gears—because you can bring your car or truck up-to-date in this regard at a very small cost.

In the first place, the flexible-web of the Textolite gear absorbs the crankshaft whip which causes the destructive vibration in the engine.

Then the non-metallic construction of the Textolite gear eliminates the metal to metal clashing in the timing gear train. This permanently silences the greater percent of all engine noise.

You can enjoy these qualities in your car—we have shown the way. Do not delay having a Textolite silent timing gear installed in your car or truck as each mile you run without it accumulates motor noise and hastens depreciation. The increased trade-in value of your car will alone more than pay for the cost of a Textolite installation. Ask your serviceman today.

Distributors in all principal cities

JOHN C. HOOF & COMPANY

Sole Distributor to the Service Trade

157 WEST ILLINOIS ST., CHICAGO, ILL.

JOHN C. HOOF & CO

TEXTOLITE SILENT TIMING GEARS

A GENERAL ELECTRIC PRODUCT

This advertisement appears in the February 2nd issue of the Saturday Evening Post.

On the opposite page is a reprint of the first of a series of advertisements appearing in the Saturday Evening Post on Textolite silent timing gears. Through this campaign motorists everywhere will be shown

1. How Textolite silences motor noise.

2. How Textolite doubles the life of an engine.

3. How Textolite increases the trade-in value of a car. All of which means profitable business for the dealer who handles Textolite gears. Ask your jobber about Textolite and the sales cooperation that we give our dealers. You will find that Textolite timing gears are most profitable, from the standpoint of rapid turnover and satisfied customers.

JOHN C. HOOF & COMPANY

SOLE DISTRIBUTOR TO THE SERVICE TRADE

157 West Illinois Street · Chicago, Illinois

Protects Your Motor

MOORE MOTOR SEMAPHORE

Instantly Read Day or Night while driving

Red and green discs — one inch in diameter give perfect visibility. The full green disc opposite the open circle indicates a cool motor, while the full red disc opposite the open circle indicates an over heated motor. Red and green showing equally indicate the motor running normally.

THE success of the Moore Motor Semaphore is due to *distinct* advantages over other motor heat indicating devices.

In addition to its simplicity of construction and attractiveness in design, it is *positive* in action.

It is *mechanical*—not chemical or electrical. Only *two* working parts—the thermostatic element and semaphoric arms.

The Moore Motor Semaphore is made in three models and for all cars—

Master	Model	$9.00	List Price
Standard	"	7.50	" "
Junior	"	3.50	" "

In completing the line of Moore Motor Semaphores with the new Junior Model, our many jobbers and dealers are now assured of an increased volume of business.

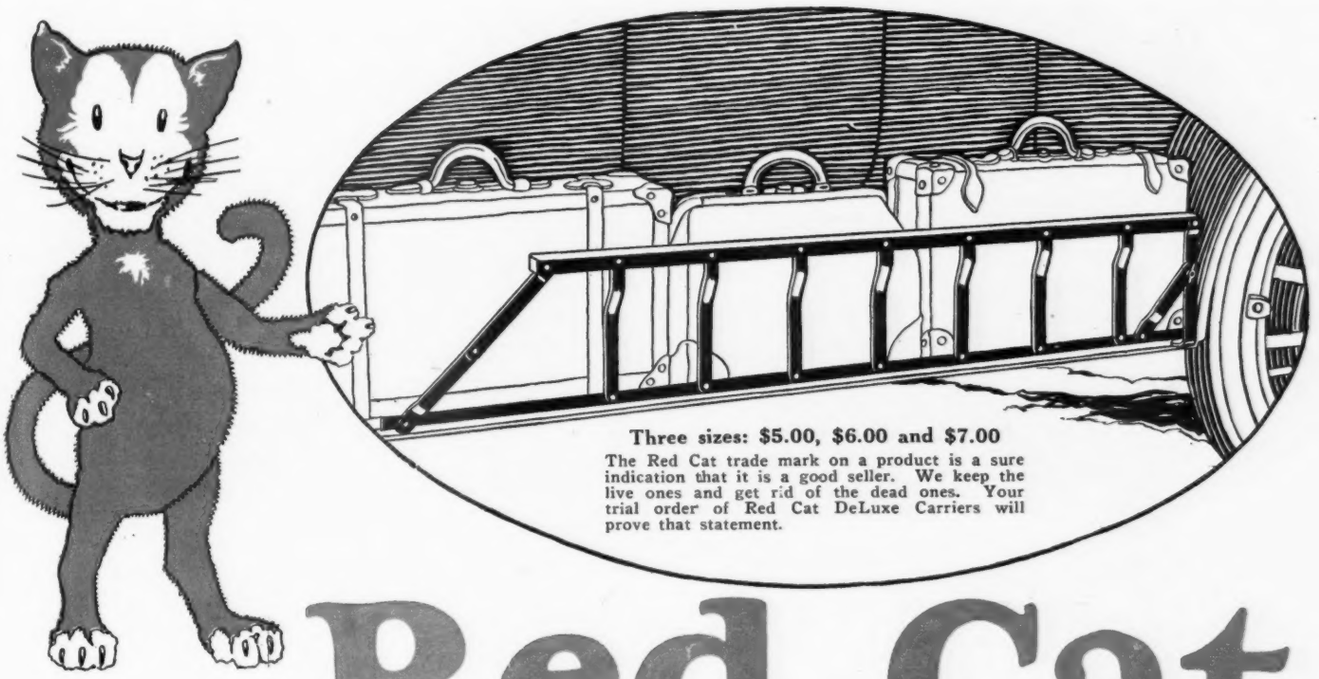
The Moore Motor Semaphore has become a very profitable addition to the accessory line of many jobbers and dealers.

Write for our liberal proposition.

SEMAPHORIC INDICATOR SALES CO.
1102 S. California Ave. Chicago, Illinois

Our product has been on the market for more than two years.

No suit has ever been brought against us for the infringement of any patent.



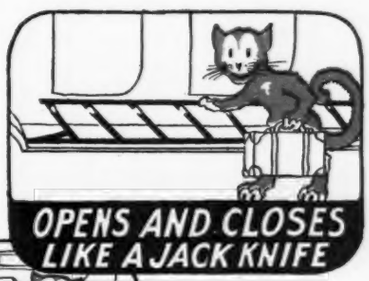
Three sizes: $5.00, $6.00 and $7.00

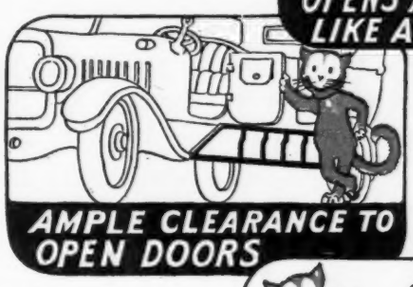
The Red Cat trade mark on a product is a sure indication that it is a good seller. We keep the live ones and get rid of the dead ones. Your trial order of Red Cat DeLuxe Carriers will prove that statement.

Red Cat DELUXE CARRIER

This is the new type carrier which changed luggage rack fashions almost over night.

Announced at the Chicago show just a year ago it met with instant success. Thousands upon thousands were sold during the year. The public took the idea like a flash. NOW they could have a luggage carrier as PERMANENT EQUIPMENT, ready at a moment's notice, but out of the way and out of sight when not in use. It sold on sight.





You Profit More

The very fact that it is a Red Cat product proves its worth. We back "live" sellers only. If a product can't sell fast we throw it out and get one that does. We want this Cat known throughout the United States as the brand of speedy sales.

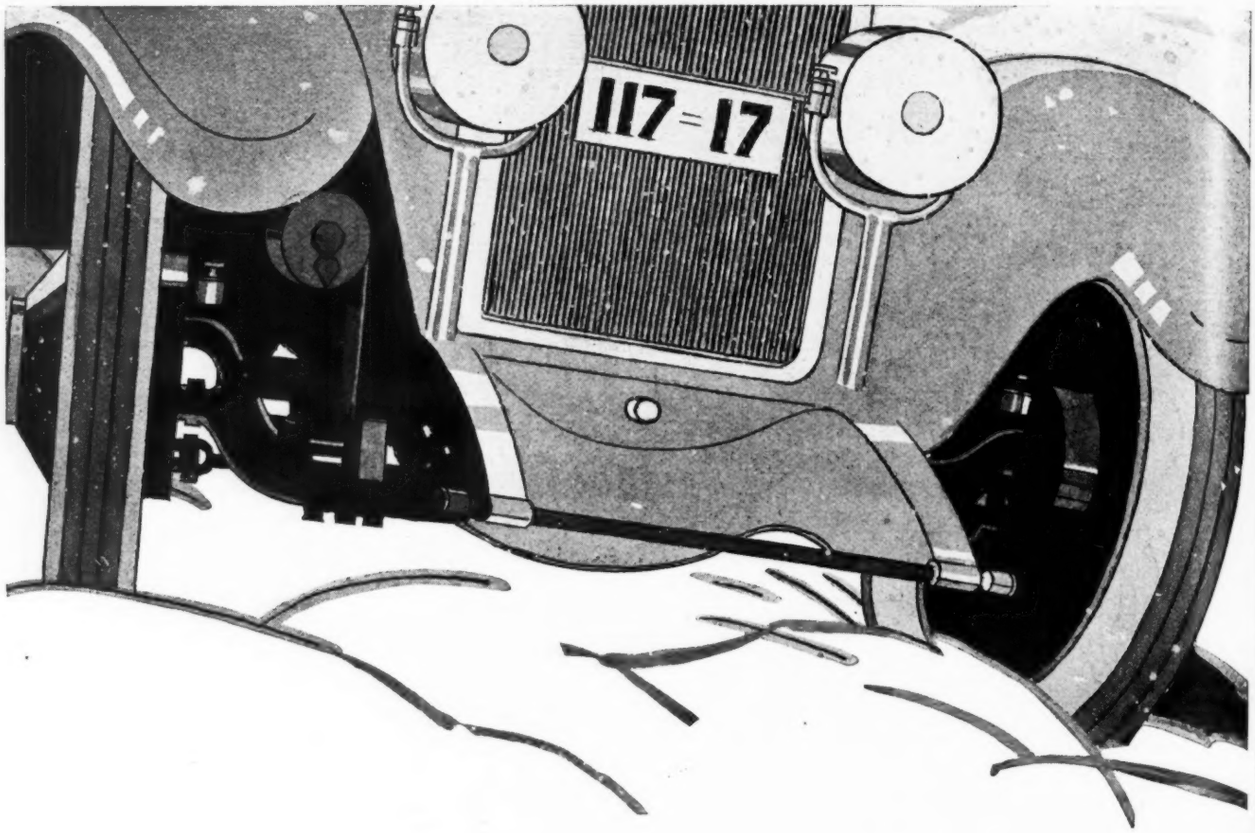
The Red Cat DeLuxe Carrier is one of our best. If you are not selling it you are missing a big profit maker. Hundreds of car owners who used to object to the old type luggage carrier as "ugly" and "in the way" say "now that's more like it."

In this item we offer you ready sale and long profit—that's a combination you should never pass. Made in three sizes, $5, $6 and $7. A trial order as a starter will begin a friendship between us that we hope will last for many years to come.

Look for the Red Cat on quick sellers.

G. A. ROTH MFG. CO.
HASTINGS, NEBR.

Write for details of how to get a free Red Cat DeLuxe Carrier display stand, a regulation running board on legs. It speeds up sales and does not cost you a cent.



Is smooth riding possible over rough roads?

LET'S see what takes place when your car hits a bump. The blow is received by the wheels and passed on up to the car springs. The springs yield to the blow and thus act as cushions keeping the blow from the car proper and from you.

Then why do we object to bumps? It's simply this—the compressed springs do not stay compressed, but immediately turn and shoot at us (recoil) just like a compressed (bent) bow recoils and shoots an arrow. Right there you find the hurt—the hurt is in the recoil—and it is the recoil therefore which we must get after and *control* if we want any improvement in our riding. And the extent of improvement will depend precisely upon how correctly we *apply* the control.

Does a car spring always recoil with the same force? Does a bow always recoil with the same force? No. The farther you bend it out of its normal shape (compress it) the more violently will it recoil and shoot. A small bump will compress a car spring only a fraction of an inch, and thus slightly compressed the recoil force will be as little as 1 *ounce*. A big bump will fully compress a car spring and the recoil force will then be as great as 1500 *pounds*. And in be-

tween these two extremes the recoil force will vary according to each different extent to which the spring has been compressed.

Some job, you say, to *properly* control each and every one of these thousands of different forces. Yes, it has been a job, but the job is now done and the devices which do it, STABILATORS, are at your service and anxious to help you.

STABILATORS automatically and instantly and unfailingly measure out just the proper resistance to properly control a shoot force of 1 ounce or 1500 pounds or any force in between.

This principle of *proportional* control is exclusively a STABILATOR principle and should not be confused with the snubbing principle employed in other devices which is exactly the reverse of proportional control. The achievement of this proportional control is the very essence of STABILATORS tremendous success.

And STABILATION *is* a tremendous success. In two short years a most impressive number of America's finer cars have adopted STABILATORS as a standard factory feature and some sixty thousand owners have already invested upwards of four million dollars for STABILATED motoring.

Write today for literature showing just how STABILATORS automatically measure out this proportional and hence correct control for each variation in recoil force.

JOHN WARREN WATSON COMPANY *Twenty-fourth and Locust Streets* PHILADELPHIA

The above is the logic which makes STABILATORS instantly salable and hence profitable to the Dealer and Distributor.

The minute any car owner understands the real cause of rough riding, he sees plainly why STABILATORS are the really correct remedy and he *wants* them.

The essence of profitable selling is to have a product the correctness of which the purchaser can *see for himself*.

Write for distributor or dealer proposition.

WATSON STABILATORS

Change the Whole Nature of Your Car

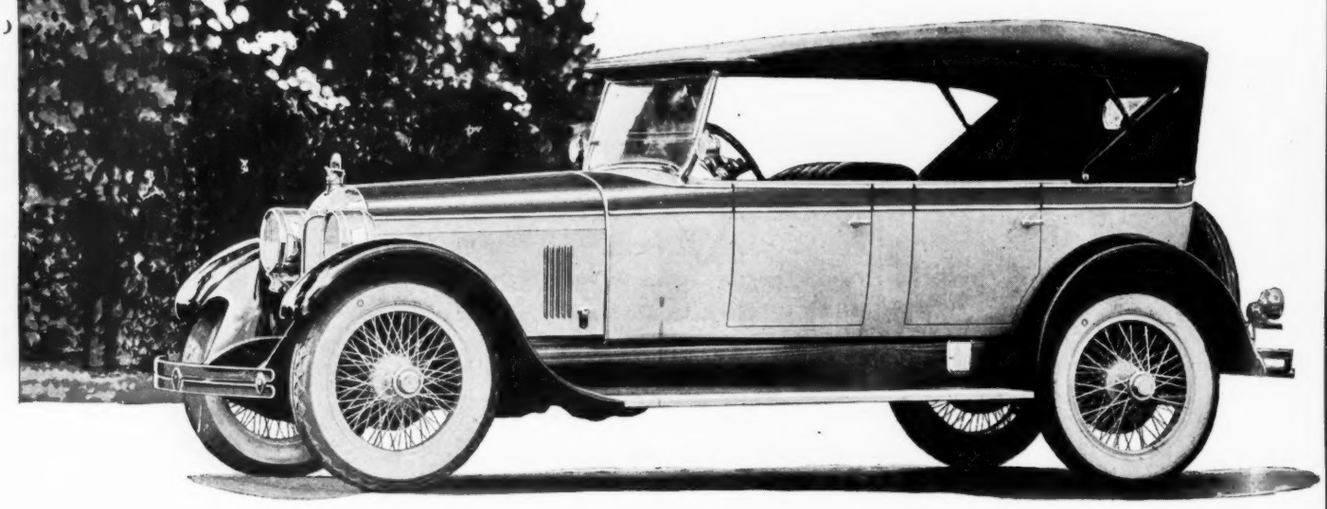
DUESE

Special Exhibit

Detroit Electric Sales Co.
2416 Michigan Ave.,
Chicago

Factory Sales Department Representatives at this Special Exhibit.

DUESENBERG AUTOMOBILE
& MOTORS CO., INC.
INDIANAPOLIS

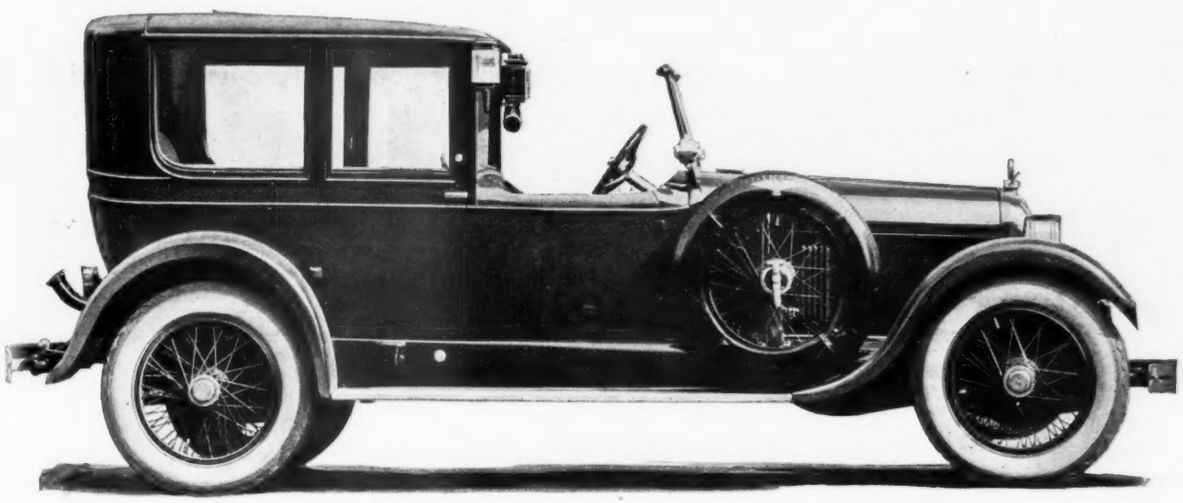


ENBERG

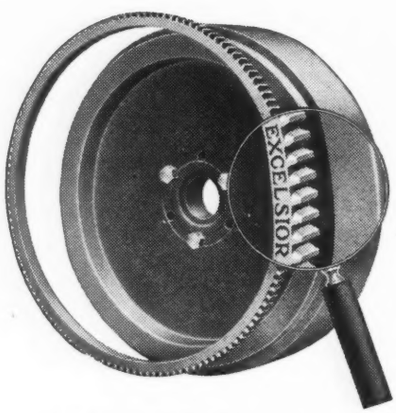
The Original Straight-Eight With Four Wheel HYDRAULIC Brakes

See These Cars During the Show

Are you ready for the Spring? The Duesenberg is merchandise that appeals to those who insist upon quality and upon performance. Even in small cities of less than 25,000 there is a ready demand. During five months the Siemon Motor Co. of Greensburg, Pa., with three other lines, sold eleven Duesenbergs with a total sales value of $67,500. That shows the unusual opportunity for real merchandisers. Except in a few instances the metropolitan cities only are now covered by Duesenberg distribution.



Shrink on a STEEL FLY-WHEEL GEAR



Excelsior Steel Ring gears are made of S.A.E. 1035 steel. They are cut and chamfered to the correct diameter and pitch to insure quiet, smooth engagement with the starter pinion. Each gear is specially heat treated and then weld tested under hydraulic pressure. Made in accurate sizes to fit any specified American car or truck.

YOU please your customer, save him money and turn out a better job in less time by replacing battered flywheel teeth with Excelsior Ring Gears.

The cast iron teeth on flywheels have a common fault in becoming battered or stripping off. Obtaining a new flywheel means delay. Installing it does not eliminate the original weakness. A simple and profitable method is to machine off the old teeth, heat an Excelsior Steel Ring Gear and shrink it in place.

This insures a perfect, permanent job that will stand up under severe abuse.

Fewer flywheels on the junk pile, satisfied customers and greater profits are yours by the use of Excelsior Steel Ring Gears.

Get particulars from your jobber or direct from us.

The SPRINGFIELD MANUFACTURING COMPANY
221 West Main Street **Springfield, Ohio**

EXCELSIOR
STEEL RING GEARS

The Way to Increase Profits —Have Time Saving Tools

The facility with which you can turn out a job determines the volume of your profits. If you increase your number of jobs 25 per cent you increase your profits still more.

Lost time removing and replacing valves and valve springs is over!

Three (3) sizes of these spring holders—which accompany the tool—will fit or hold 95 per cent of all automobile and truck valve springs.

LITTLE WONDER

VALVE SPRING COMPRESSOR

Does it Easily and Quickly

This tool compresses the spring and holds it until the lock nut, pin, horseshoe or half moon is removed. Release the tool—take out the spring or valve. No slips, no skinned knuckles, no lock nuts in the oil pan or crank case.

It's really a Little Wonder, and men who are using it would not take $25 for it if they could not get another.

OUR GUARANTEE

Every Little Wonder is guaranteed for one year against inferior workmanship or poor material. Should any part break from use we will repair or replace it free of charge.

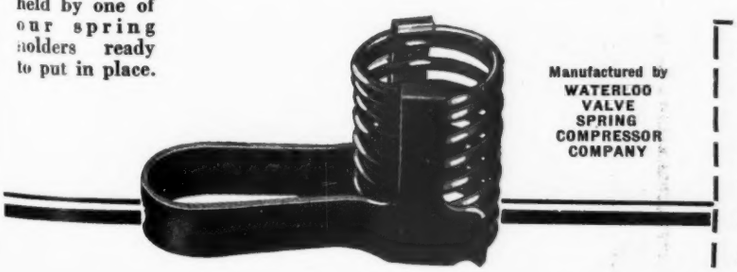
This is The Little Wonder which includes the THREE Spring Holders shown on this page.

Showing valve and spring partially compressed to remove key.

The illustration at the right shows a spring compressed and held by one of our spring holders ready to put in place.

Top view of Little Wonder with the spring compressed in jaw to fit holder.

Little Wonder Valve Tool Co.
Not Inc.
Sales Department
606 ONEIDA ST. JOLIET, ILL.
P. O. Box 1028



Manufactured by WATERLOO VALVE SPRING COMPRESSOR COMPANY

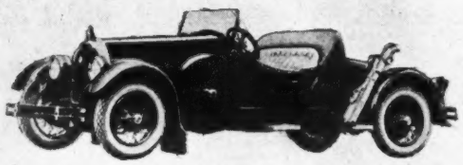
Little Wonder Valve Tool Co., (Not Inc.)
606 Oneida St., Joliet, Ill. P. O. Box 1028

Enclosed find $7.25 (draft or money-order) for which send The Little Wonder Valve Tool. OR—If remittance is not enclosed please send The Little Wonder Valve Tool C. O. D.

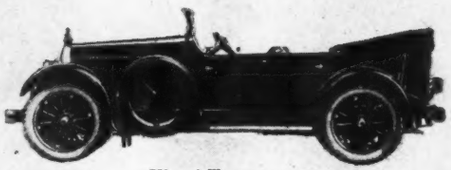
Name.....

Address.....

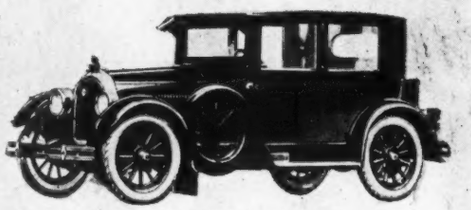
City..... State.....



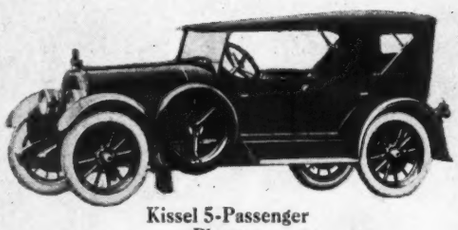
Kissel Speedster



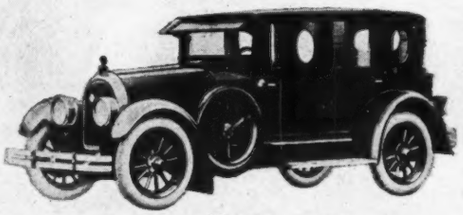
Kissel Tourster



Kissel Victoria



Kissel 5-Passenger
Phaeton



Kissel
Brougham Sedan

Kissel 7-Passenger
Berline-Sedan

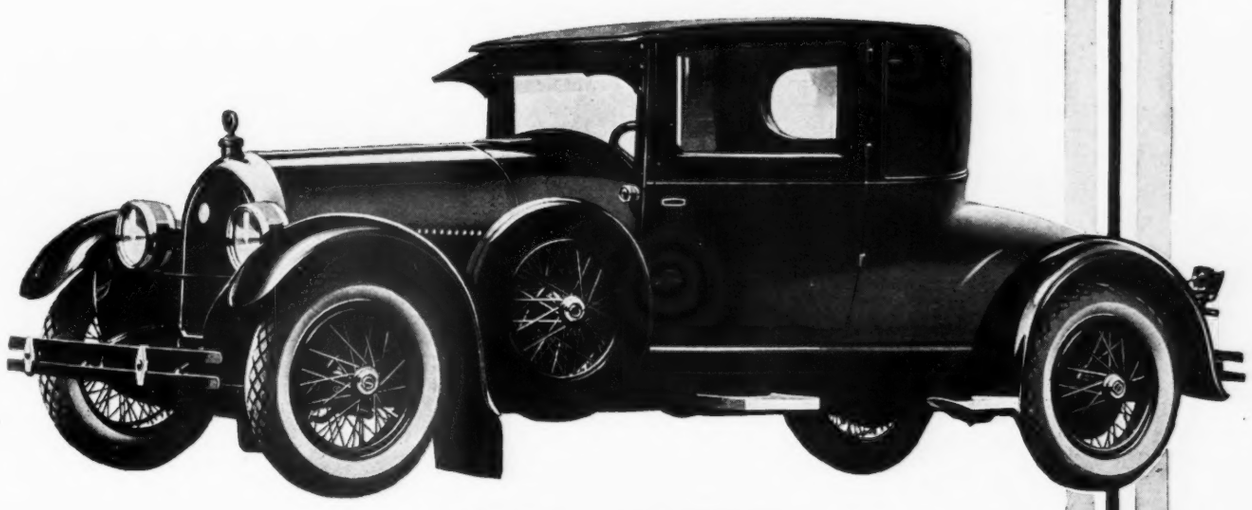
Nothing Like This New Kissel — Either Here Or Abroad

In presenting this strikingly original creation — the Enclosed Speedster — at the Chicago Show, Kissel not only ushers in an entirely different and distinct type of motor car, but again gives unmistakable evidence of the fine craftsmanship and rare ingenuity long identified with this name. The new model follows the low-set, racy lines of the famous Kissel open Speedster and has many of this car's characteristics, including individual aluminum steps, golf bag holder, special full crown fenders and wire wheels. With the outstanding body beauty of this car Kissel unites an equally noteworthy excellence in performance. On this car and throughout the entire Kissel line optional equipment of Hydraulic Four Wheel Brakes and Balloon Tires is provided at a slight additional cost.

KISSEL MOTOR CAR COMPANY
Hartford, Wisconsin

KISSEL

CUSTOM BUILT



Kissel Enclosed Speedster

Vitek Patents Pending

The Hose Clamp With Many Exclusive Features

When Vitek Makes It, It Must Be Good

Our No. 3 universal size will fit hose sizes from $1\frac{1}{4}$ to $2\frac{1}{2}$ which is about 90 per cent of all the sizes used in the repair shop. It can be adjusted to any of these sizes without cutting or breaking off any surplus length which causes an unnecessary delay and dangerous sharp corners.

All EveR-HolD Hose Clamps are assembled, rolled up, and ready to apply. Made of galvanized strip steel with nickel plated machine screw.

Notice to Jobbers and Dealers. Before putting in your supply of clamps for the season, be sure to get our samples and prices on clamps and other good sellers we make.

When the U. S. Air Mail Service Uses Ever-Hold Hose Clamps There Is a Reason!

Made Exclusively By

VITEK MANUFACTURING CO.

Industrial Bldg., Omaha, Nebr.

The Makers of High Grade Automotive Supplies

A Quality Lite for Quality Cars

These high quality Spot-Lites instantly appeal to the car owner. They are the MOST POWERFUL made and as they come out of our modern factory, we are satisfied that a better, more practical or durable Spot-Lite cannot be made.

S & M Spot-Lites

"Show the Road the Clearest"

Our distribution is NATIONAL. We are as near to you as your jobber.

To attract quality business and to turn over a good profit quickly, get one of these S & M Display Stands and cash in on our reputation for making "America's Best" Spot-Lite.

One of these S & M Silent Salesmen on your Counter will stop many a customer to admire and buy!

Send an order to your Jobber today

S & M LAMP COMPANY

118 West 36th Street, Los Angeles, Cal.

The Demand for Complete Motor Rebuilding Is Answered by

CANEDY-OTTO

Floor Crane

The movable floor crane is indispensable in moving heavy parts, and lifting motors from the chassis.

Motor Stand

The C-O Universal Motor Stand saves hours of time in tearing down and rebuilding motors. And it makes every part accessible.

Canedy-Otto Equipment is a big factor in rebuilding motors. Saving time and labor, it makes possible even larger profits.

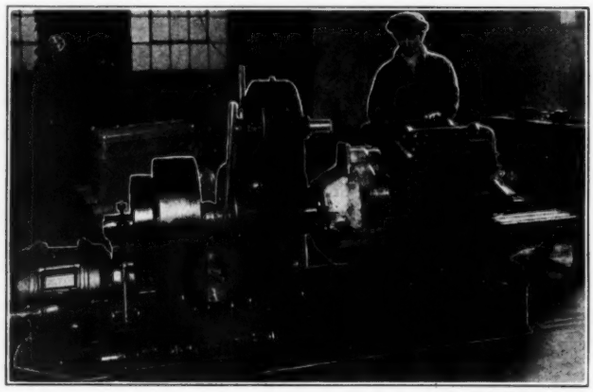
Today, the shop equipped for completely rebuilding motors is making profits as never before. Car Owners are tired of taking their cars to a half dozen shops, to have them rebuilt. They know that it means needless delay and expense.

Therefore, they patronize those shops equipped to do the complete job—from grinding cylinders to burning-in the bearings—and naturally, the shops so equipped make many times the profit.

C-O AUTHORIZED FACTORY EQUIPMENT

All service equipment for leading Motor Car Manufacturers such as Buick, Studebaker, etc., is designed and produced by Canedy-Otto in conjunction with Factory Service Engineers.

Canedy-Otto has originated and developed much of the modern equipment that makes profitable servicing possible.

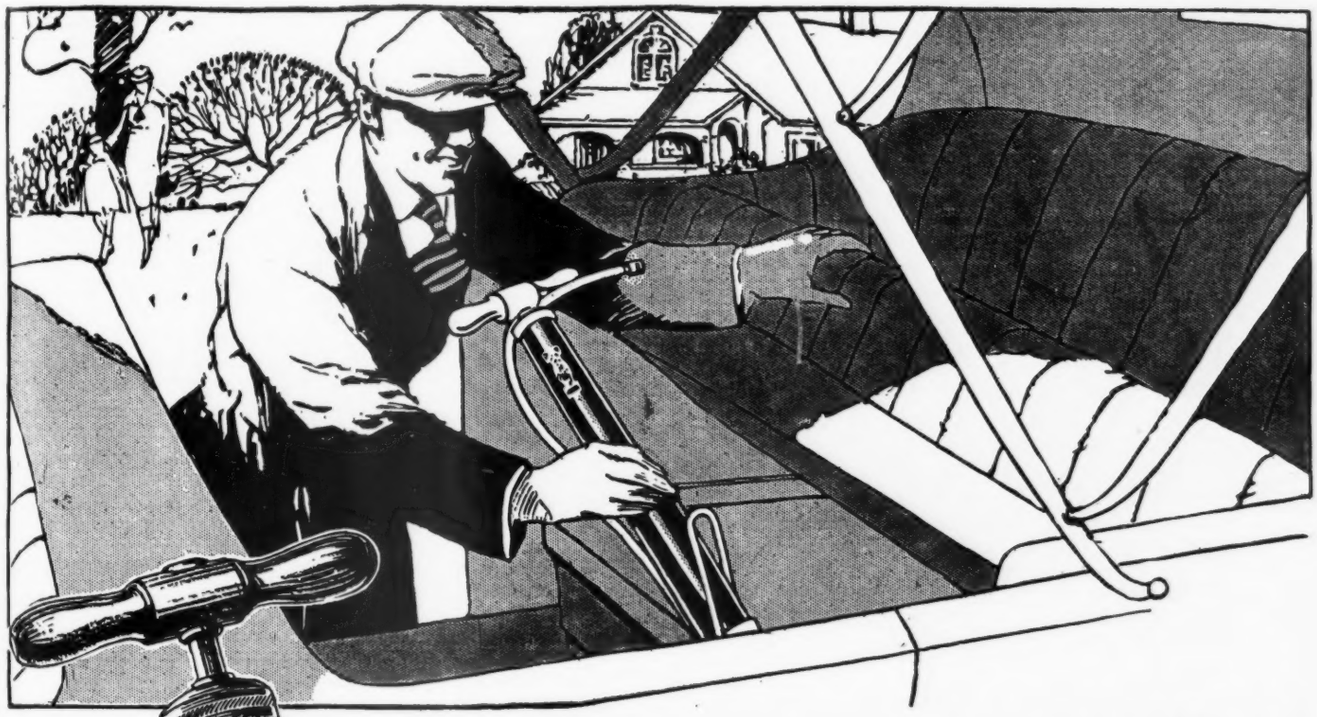


The Carlson Machine Works, Sioux City, Ia., finds the C-O UNIVERSAL Running-In Machine a big profit-maker and business-builder. Running-in Bearings on a King V-Type "8".

Investigate the C-O line of shop equipment. Let us show you how it will make profits easier and bigger for YOU. Write at once for Canedy-Otto Shop Profits Bulletin.

CANEDY-OTTO MANUFACTURING CO.

Chicago Heights, Ill.



The Best Reason in the World for Confidence—

Easy Pumping

Quick, smooth, easy strokes! There's real satisfaction in pumping with a Rose Tire Pump. No lost effort. No air leakage. No heavy up stroke. Every ounce of energy counts and the tire is hard in a jiffy.

Perfect satisfaction stands behind the wonderful sales record of the Rose Tire Pump.

The ROSE Lubricator

The popular high pressure lubrication set for Fords now $3.96, complete with six fittings. Considered the best value ever offered Ford Car owners for high pressure lubrication.

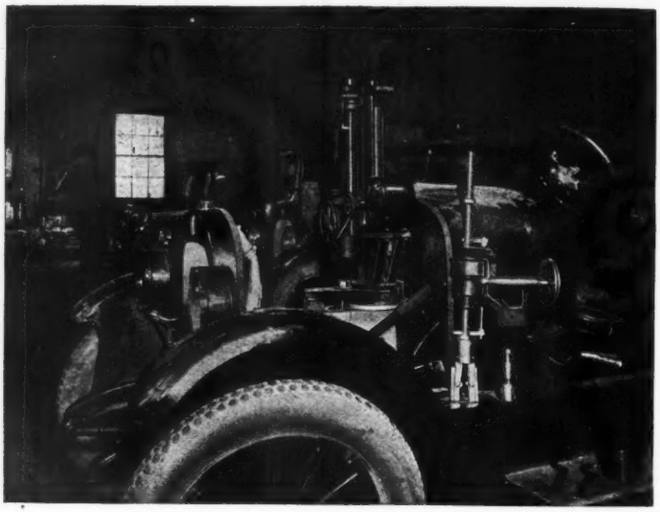
Write for full particulars if you are not already familiar with this popular seller.

ROSE

Easy Valve Action TIRE PUMP

MANUFACTURED BY FRANK ROSE MFG. CO., HASTINGS, NEBR.

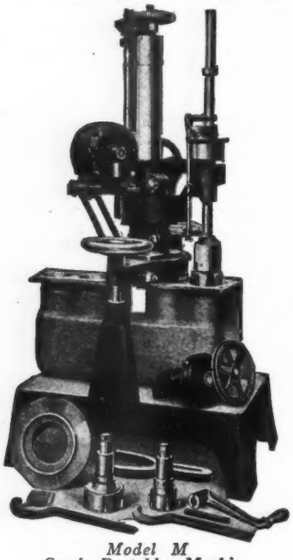
THE MOST VALUABLE EQUIPMENT IN THE SHOP



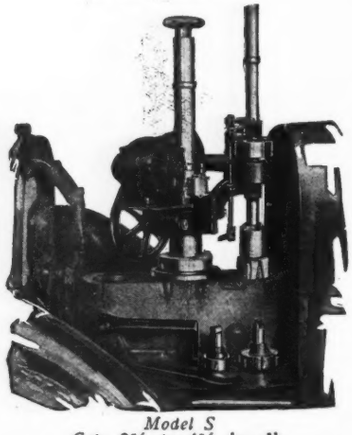
Model M Machine automatically STORMIZING Durant Motor in the Chassis. Owens Motor Co., St. Paul, who operate one of the largest and best equipped shops in the Northwest, after one year's use says: "We find it the most valuable equipment in our shop."

STORMIZING

The Better Method of Cylinder Reconditioning



Model M
Semi Portable Machine
Cap. 2⅝ to 6 in. dia.



Model S
Cap. 2⅝ to 4½ in. dia.

A Most Profitable Investment

With STORM equipment you can handle all types of cylinder work rendering efficient and thorough service in an exceptionally short time. The automatic operation of STORMIZING machines means valuable hours saved, allows a bigger margin of profit on the individual job and at the same time permits you to handle many more jobs.

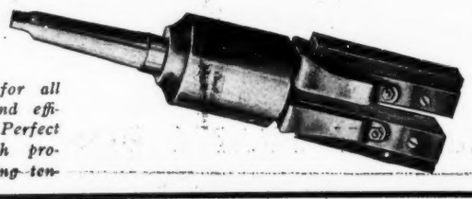
The car owner today is patronizing the shop that gives him complete service and handles all the work itself. The Storm equipped shop soon builds up a profitable reputation for high quality work and the best of service. If you are seeking bigger profits and quicker shop turnover, install STORM equipment. You will find it truly a profitable investment.

STORM MFG CO

406 A Sixth Ave. So.,
Minneapolis, Minn.

STORM HONE

Instant adjustment for all cylinders. Speedy and efficient in operation. Perfect "Gun Barrel" finish produced; proper grinding tension for any and all diameters; absolute self centering; fast cutting and perfect balance of pressure. Takes all sizes 2¾ to 8 in. Complete and with extra stones for fast cutting $40.25.



Look for this on the box

TRADE MARK

and get the genuine Universal Hose Clamp

It has three prominent features that distinguish it from all others

The patented "Bead" — the scores between holes — also patented — and QUALITY metal scientifically treated.

Anyone can punch a piece of metal full of holes and call it a hose clamp—but that doesn't MAKE it a hose clamp.

We make nothing but hose clamps. We claim they are BETTER hose clamps because they are made better—of better material — work better and wear better than cheaper clamps.

And in the long run—Universal Clamps ARE cheaper. Quality does the trick.

One size—1 to 3 inches—adjustable to fit any hose of any size. We also make a clamp called "Junior" which takes hose from ¼ in. to 1½ in.

Universal Hose Clamps at all good jobbers all the time—as the trade well knows.

UNIVERSAL INDUSTRIAL CORPORATION

Hackensack, New Jersey

Patents Granted
March 20, 1917
March 1, 1921

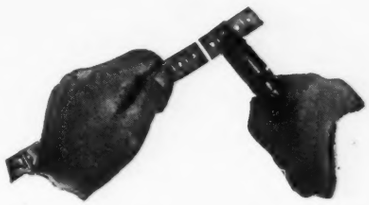
CHICAGO
F. C. West Corp.
616 S. Michigan Ave.

BOSTON
Burton Rogers Co.
755 Boylston St.

PHILADELPHIA
T. Scott Eavenson
1536 Cherry St.

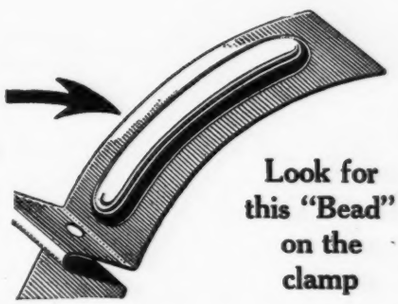
DALLAS
Harry Knight
2218 Commerce St.

Also—



Look for the Scores between holes—

They make possible a quick, clean edged break-off. They save time and money.



Look for this "Bead" on the clamp

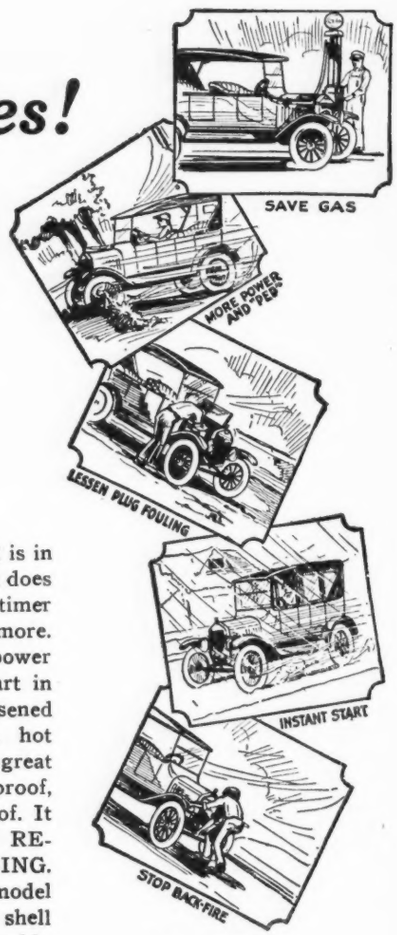
It creates a pressure that provides an everlasting leak-proof connection.

Look For The TRADE MARK On Every Clamp

UNIVERSAL HOSE CLAMP

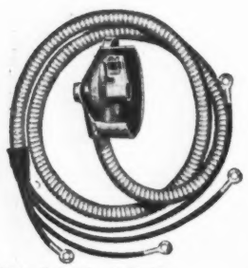
Adjustable to fit any hose of any size

Stops Timer Troubles!



Dealers everywhere are taking advantage of the extra sales offered by the famous TURNER TIMERS for Ford Motors. These products assure you of a quick turnover and a fair margin.

The TURNER TIMER is in no sense a makeshift. It does everything that a good timer is supposed to do—and more. It means increased power and "pep"; an easy start in all weathers; greatly lessened plug fouling; a long, hot spark resulting in a great saving of fuel. It is oil-proof, grease-proof, water-proof. It is easily installed and REQUIRES NO OILING. Price complete, 2 in 1 model with aluminum alloy shell and enclosed wiring assembly $3.60. "Junior" with Bakelite shell $2.50.



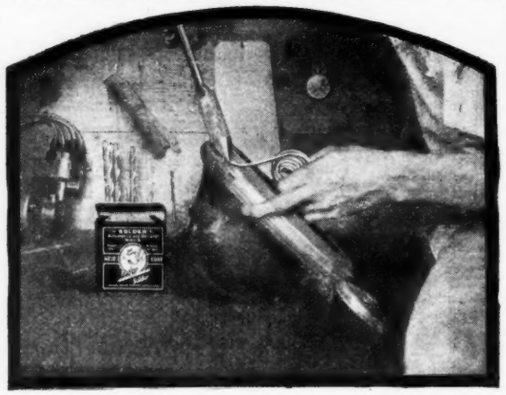
Pat. 2-15-16. 9-18-23.

AT THE CHICAGO SHOW

The Turner Line including 2 in 1 Carburetor Control, Instant Foot Accelerator, Door and Throttle Extension and All Metal Visor will be on display at space 39 Coliseum Annex Basement.

Turner Manufacturing Co.
Dept. K. Kokomo, Indiana

TURNER 2 IN 1 TIMER



Quick—Neat and Substantial

How will the job look? Depends upon how it's done. Conspicuous places, as the hinge on the head lamp rim pictured above, can be mended strongly and neatly—with Kester *Acid-Core* Wire Solder.

No need to daub on big gobs of solder to make it hold—that's the wasteful old-fashioned way.

Here's the Kester method: Heat the job, feed Kester Solder to the spot where needed. Before the solder melts a scientifically prepared flux flows from tiny pockets, inside of Kester right where it is needed.

Then comes the virgin tin and lead solder *covering only the fluxed area.* No excess acid or solder remains on the job, thus *saving time, labor* and *material.*

"Sample for Test Upon Request"

Sold by live dealers everywhere in one pound coils, in cartons, and on one, five and ten pound spools

Manufacturers
CHICAGO SOLDER COMPANY
4203 Wrightwood Avenue, Chicago

Direct Factory Representatives:
THE FAUCETTE HUSTON CO.
Chattanooga, Tenn.
LOUIS J. ZIESEL CO.
216 Market St.
San Francisco, Cal.
DAVIES-ELY CO.
66 W. Broadway
New York City

KESTER
Acid Core WIRE SOLDER

"Requires Only Heat"

A Fine, Shiny Pump Plenty of Pressure —*and* a Leaky Hose

Some fire department! Yes, and some ignition system. What have they to do with one another?

Just this: most ignition engineers spend months devising wonderful units, and hook them together with any old wire!

In a year, or a year and a half, the insulation goes, and high-tension juice is running all over the car.

Then, through chance (or cynical experience) Paranite is used to replace the old wire. The trouble vanishes permanently.

But that does not happen frequently enough to save the reputation of many an excellent car. To stop the trouble, use Paranite at first.

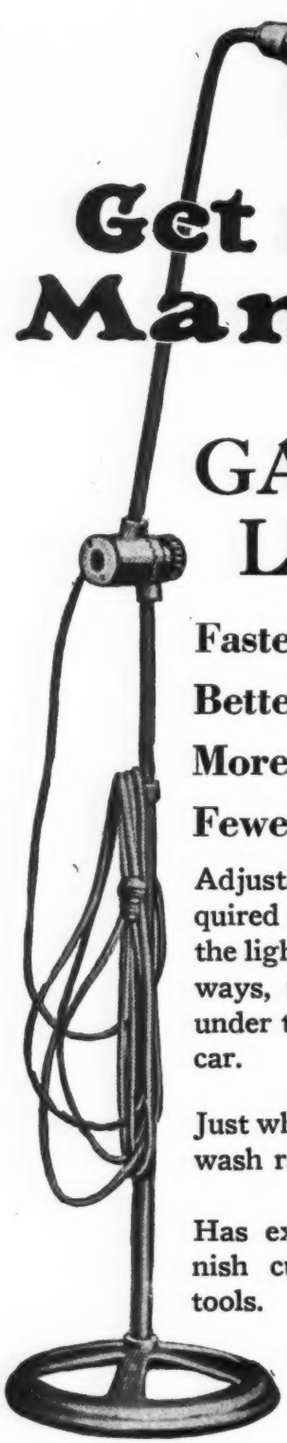
Business houses of thirty-odd years standing don't buy pages to make wild statements. We have concrete proof of these generalities, and it will pay you well to investigate them.

Indiana Rubber & Insulated Wire Co.
Jonesboro, Indiana

A. J. Musselman
549 W. Washington St.
Chicago, Ill.

Geo. R. Hall
West Hartford, Conn.

IF IT'S **PARANITE** IT'S RIGHT



Get a Manley

GARAGE LIGHT

Faster Work

Better Work

More Accomplished

Fewer Headaches

Adjustable to every required position — throws the light up, down, or sideways, under the hood or under the chassis or in the car.

Just what you need for the wash rack.

Has extra socket to furnish current for electric tools.

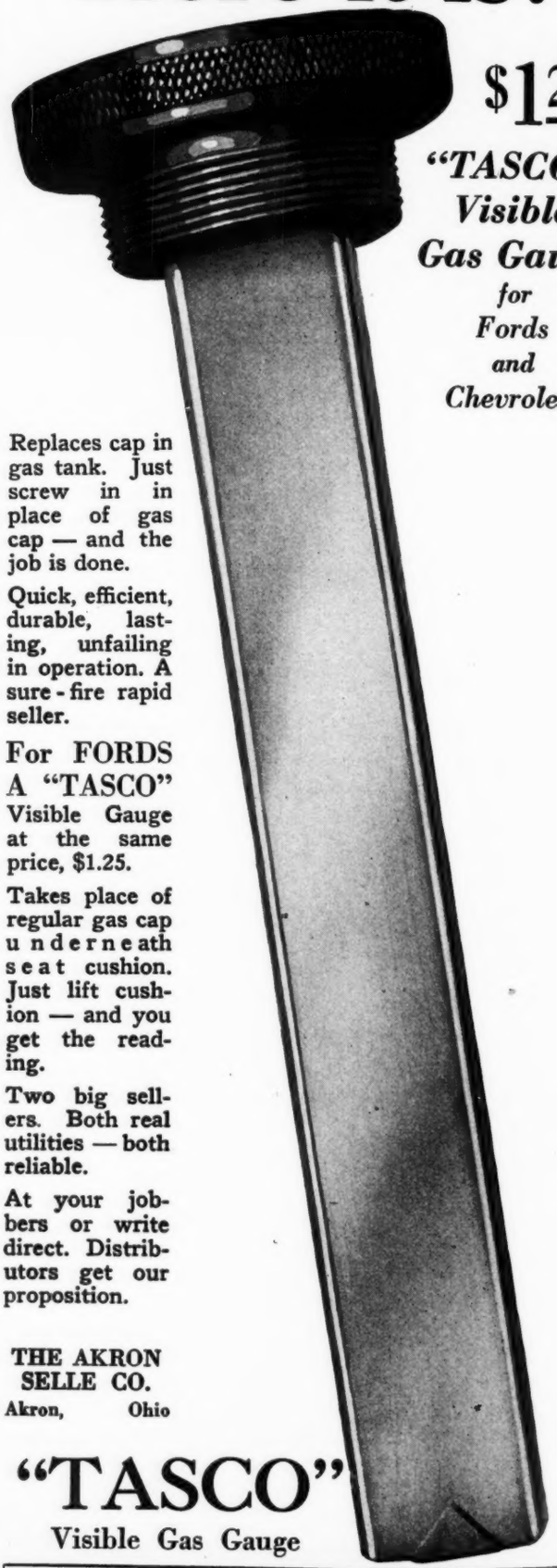
Your jobber has them

For Complete Bulletin write to

MANLEY MFG. CO.

York, Pa.

Here it is!



$1.25

"TASCO" Visible Gas Gauge for Fords and Chevrolets

Replaces cap in gas tank. Just screw in in place of gas cap — and the job is done.

Quick, efficient, durable, lasting, unfailing in operation. A sure-fire rapid seller.

For FORDS A "TASCO" Visible Gauge at the same price, $1.25.

Takes place of regular gas cap underneath seat cushion. Just lift cushion — and you get the reading.

Two big sellers. Both real utilities — both reliable.

At your jobbers or write direct. Distributors get our proposition.

THE AKRON SELLE CO.
Akron, Ohio

"TASCO"
Visible Gas Gauge

LUBRICATES
BUT
PREVENTS OILING

The beveled edge and the oil groove together accomplish this long sought ideal piston ring action.

The beveled edge collects just enough oil on the upstroke. Increasing compression gradually forces this oil into the inner groove where it is safely held at top of stroke. It cannot enter combustion chamber.

On downstroke oil is again let out on cylinder walls, forming oil seal between groove and cylinder. This prevents compression leakage and provides perfect lubrication.

Since this action is automatic—it must take place with the result that there is greater efficiency with less wear on walls and rings.

Furnished in either ground or turned finish

Universal One-Piece Piston Rings

2⅜ to 4" inclusive	40c
4 1/16 to 5" inclusive	50c

HY-GRADE PLAIN RING

Ideal for those wanting a quality ring at a low price or when used in conjunction with one Universal Oil Groove Ring.

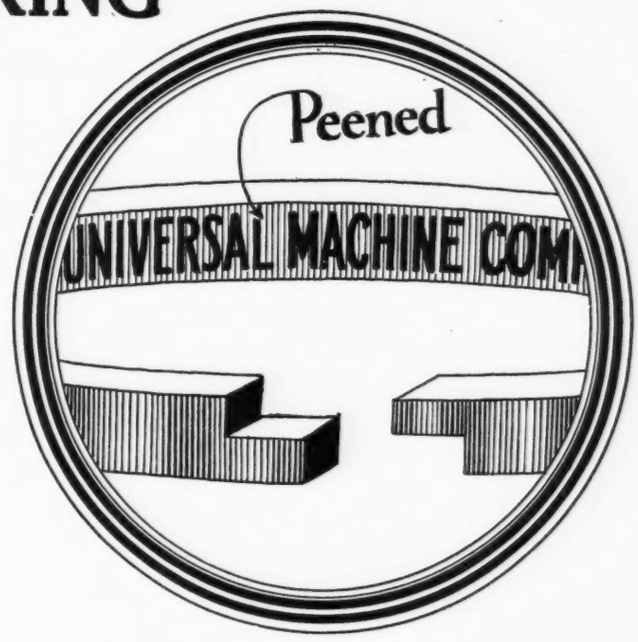
The Universal Hy-Grade Plain Ring is exceptionally well made of the best materials with a carefully peened interior circumference. It has been successfully used for years and is a high-quality, dependable ring at a low price.

Furnished in either ground or turned finish

These rings offer an unbeatable sales combination. They are of proven superiority and fill price or quality requirements or both. Universal Rings are backed by sound, ample advertising and sales help. We have a very attractive JOBBERS' proposition. Write us.

Hy-Grade peened, piston ring

2⅜" to 4" inclusive	30c
4 1/16" to 5" inclusive	40c



Universal Machine Company
Baltimore, Md.

UNIVERSAL
ONE PIECE PISTON RING

SHAFER

Self-Aligning ROLLER BEARING

PAT. & PATS. PENDING

SHAFER Roller Bearings are guaranteed to give satisfaction when properly assembled. They are capable of taking severe thrust and radial loads applied from any angle. They are full self-aligning to shaft deflections and adjustable for wear.

Our new service catalogue is now ready for distribution

SHAFER BEARING CORPORATION
6501 WEST GRAND AVENUE
CHICAGO, ILL.

MANZEL
HYDRAULIC
SHOCK ABSORBERS

Become A "Manzel" Distributor—It Pays

Dealers and distributors everywhere who sell "Manzel" Hydraulic Shock Absorbers make good profits and a long list of satisfied customers.

The reasons are many. Unlike the conventional type of rebound absorber, "Manzel" Hydraulic Shock Absorbers retain their original efficiency throughout the life of the car, with no mechanical breakdown or wear from the ceaseless hammering on the car springs.

And they bring an entirely new conception of car riding. Automatically proportioning their action to the size and severity of the bump, they ease the springs down so gently that the road shocks are scarcely felt.

Every road is smoothed out—and all this without the slightest effect on the operating efficiency of the "Manzel", because the work is done by automatically controlled oil and not by springs or mechanical action.

"Manzel" Shock Absorbers offer a proposition of genuine interest and profit. Though considered by motorists everywhere the most efficient instruments yet produced for reducing shocks, they sell at a far lower price than any other high grade shock absorber and therefore have a broader market.

They are adjustable to any weight of car. Their installation is simple and they will give efficient service for a life time.

If you are interested in a money-making, customer-satisfying proposition, why not look into the advantages of having the "Manzel" agency in your town. Write for details anyway.

See us at Chicago Show—Booth 61

Manzel Brothers Company
306 Babcock Street
BUFFALO NEW YORK

The Inside Facts

VEE ROUND
for Grooved Pulleys

Notice the sturdy construction of this belt. Ply upon ply of rubber saturated fabric, built up endless, wrapped and vulcanized around a solid rubber core. No strings or cords to break. Not a weak point in the entire belt.

Rie Nie Vee Round Belts wedge themselves tightly into the groove regardless of the angle of pitch. Thus assuring maximum driving power with practically no slippage. This self adjusting feature means that **fewer sizes are required for a complete stock.** Making a quicker turnover on a smaller investment and bigger profits.

Carry One in Your Car Wherever You Are

FLAT TYPE
for Regular or Crowned Pulleys

Built of many plies of gum dipped fabric, cut on the bias, so as to give greatest possible strength. Rie Nie Fan Belts are securely wrapped and vulcanized in a special cover jacket which prevents ply separation and keeps oil and water from seeping in between the plies of fabric. The compound with which the fabric is impregnated insures superior gripping power, eliminates slipping and keeps the engine from overheating. Carefully constructed so as to properly fit the cars they are made for. You can buy a higher priced fan belt but not a better one.

There Is a Rie Nie Fan Belt to Fit Every Make of Passenger Car, Truck, Tractor and Circulating Water Pump

Rie Nie Automotive Products

All in One Dressing
Aluminum Enamel
Battery Paint
Bearing Blue
Clutch and Brake Compound

Enamel (Air Drying)
Enamel (Cylinder)
Fan Belts
Gasket Cement
Graphite

Metal Polish and Nickel Polish
Patch
Pedal Pants
Polish—Auto Body
Radiator Hose
Rim Paint

Leather Dressing
Radiator and Rubber Cement
Orange Shellac
Gasket Shellac
Rubber Filler and Cement

Spring Lubricant
Tire Mica and Tire Talc
Tire Paint
Valve Grinding Compound
Varnish (Clear Auto)

Most Every Jobber Has Them

DURKEE-ATWOOD CO.
MINNEAPOLIS, U. S. A.

Write Us Direct if Your Jobber Hasn't

This Sells Wheel Pullers!

—and we can prove it

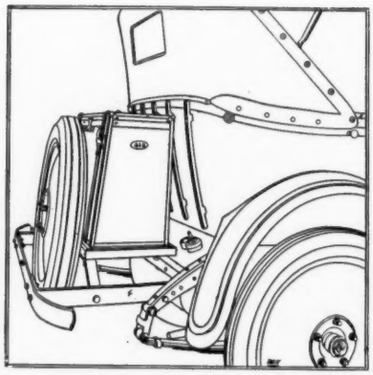
Triples Sales —automatically

And it is FREE. The jobber pays only for the Crane Wheel and Gear Pullers displayed on it. Painted in bright, attractive colors, this display rack is proving the best kind of a salesman. Jobbers report big increases in wheel-puller sales since standing it on their floors. "Well displayed is more than half sold." This display stand carries the complete CRANE line for 1924—8 pullers, two styles, namely, two arm and Crofoot pullers in four sizes, No. 0, No. 2, No. 3, No. 3X—every item with a record for steady turnover. Positively no slow-moving merchandise included. Sell direct from this display stand—and double or triple your wheel-puller turnover.

Write, right now.

Crane Puller Co.
Arlington, Mass.

CRANE WHEEL & GEAR PULLER



A & B *SPORT* EQUIPMENT

Dealers who do not have a trunk equipped sport model are now offering the A & B Sport Equipped Car.

A small investment and one hour's time puts a Sport Model on your sales floor which will attract the attention of many new prospects.

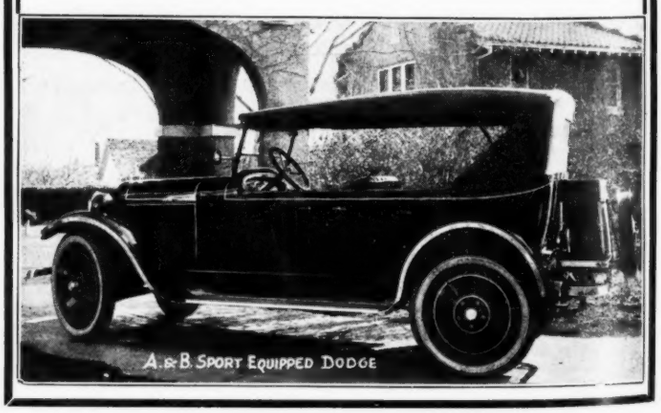
A & B Sport Trunk Equipment adds greatly to the appearance of any car as well as provides more space for luggage.

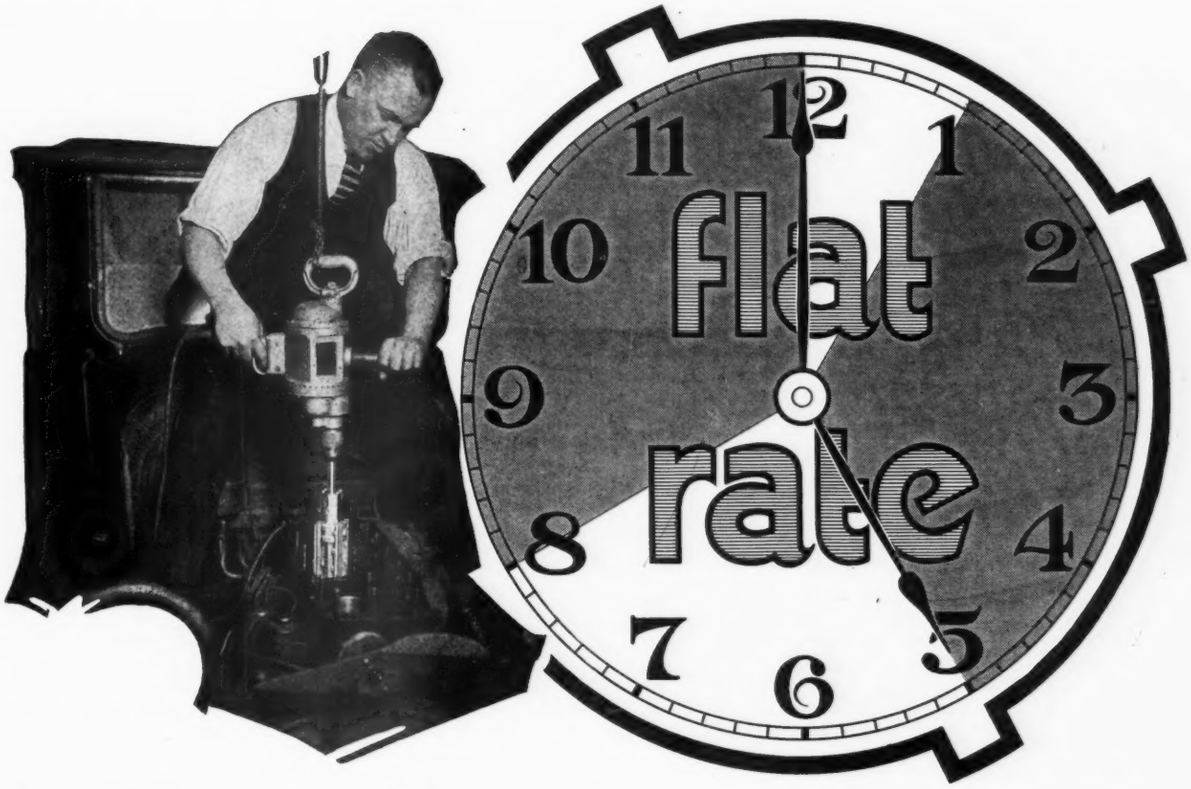
A & B Trunks are shipped complete with base board — trunk rack — body rails — water proof trunk cover—tire rack and fender guards or rear bumper.

Dodge Sport Trunk Complete.....$60.00
Hupmobile Sport Trunk Complete.....$65.00
PRICES FOR OTHER CARS ON APPLICATION

Write for Illustrations

A & B SPRING MFG. CO.
Oklahoma City Oklahoma





Is Time Eating Up Your Profit on Flat Rates?

The reconditioning of a motor by old methods involves not only the time actually spent on the cylinders but the time spent in taking down and assembling. While the block is being worked on the car occupies your floor space and the owner looses its use.

Honing the cylinders by the Hall method is time spent in doing only what is necessary for a perfect job. The work is done on the chassis—it can be completed in a few hours. It is quicker and more profitable to you and cheaper for the owner.

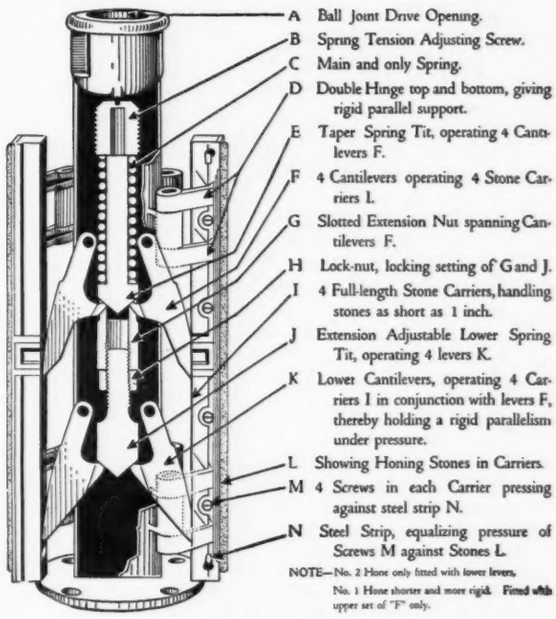
Honing is better for the motor—the engineers agree. Because it does not remove all the seasoned metal and expose a fresh texture which is subject to rapid wear.

HALL'S CYLINDER HONE

Write for our booklet, "The Scientific Application of Hall's Cylinder Hone." It gives all details and shows how three jobs will repay your $50 investment.

Order through your jobber.

THE HALL CYLINDER HONE CO.
435 Dorr Street Toledo, Ohio



A Ball Joint Drive Opening.
B Spring Tension Adjusting Screw.
C Main and only Spring.
D Double Hinge top and bottom, giving rigid parallel support.
E Taper Spring Tit, operating 4 Cantilevers F.
F 4 Cantilevers operating 4 Stone Carriers I.
G Slotted Extension Nut spanning Cantilevers F.
H Lock-nut, locking setting of G and J.
I 4 Full-length Stone Carriers, handling stones as short as 1 inch.
J Extension Adjustable Lower Spring Tit, operating 4 levers K.
K Lower Cantilevers, operating 4 Carriers I in conjunction with levers F, thereby holding a rigid parallelism under pressure.
L Showing Honing Stones in Carriers.
M 4 Screws in each Carrier pressing against steel strip N.
N Steel Strip, equalizing pressure of Screws M against Stones L.

NOTE—No. 2 Hone only fitted with lower levers. No. 1 Hone shorter and more rigid. Fitted with upper set of "F" only.

Parallel Expansion of Stones

The expansion in the Hall Hone is controlled by one spring in the center of hone body. Each stone receives an equal pressure to an equal distance. Each stone is rigidly hinged at top and bottom to prevent tipping or following a tapered cylinder. By soaking stones in kerosene all cuttings remain on the stone in the form of paste and do not drop into the motor bearings.

the seasoned metal is but skin deep—don't waste it

Go After the Big Money!

The used car problem comes mighty close to 100% solution where the car owner can get a perfect re-conditioning job **at a price he can afford.** To turn out such a job, the service station needs equipment **at a price it can afford.** Both conditions are met by

FOSTER-JOHNSON MOTOR RE-CONDITIONING EQUIPMENT

All the tools needed to put a motor into as good or even better shape than when it left the factory may be purchased at an extremely low initial investment. The first cost is wiped out by the profits from a few jobs. With a set of Foster-Johnson Cylinder Reamers and Hones, you can go after and get the big money in making old cars new.

FOSTER-JOHNSON MOTOR RE-CONDITIONING SYSTEM

is offered under franchise to high class service stations only and franchises are allotted in limited numbers. Securing such a franchise will prove the most profitable business step of your career. Delay in applying may mean "Too Late." The Foster-Johnson Re-Conditioning Plan has been tried and proved in a number of test territories. One inland station made a clean profit of $2900 in less than ten months, working with one Foster-Johnson Cylinder Reamer. Another station in a large city but located in the outskirts, reports a net profit of $22,000 in ten months. The investment was less than $600.

Fill in and mail the coupon today to learn all the details of the plan and what it will do for you. See us at the Chicago Auto Show, but don't fail to write. "Better be sure than sorry."

Foster-Johnson Reamer Co.

1144 Beardsley Ave. ELKHART, IND.

Foster-Johnson Reamer Co.
Elkhart, Ind.

Send details explaining how Foster-Johnson Motor Re-conditioning System will make money for me.

Name .....

City ..... State.....

Makes of Cars Serviced.....

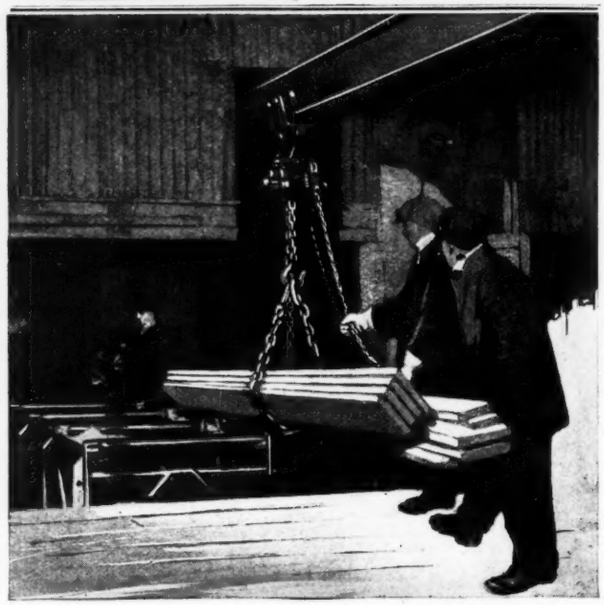
.....

Kind of Pistons.....

Proprietor .....
M.A.

CYCLONE HOISTS

HIGH SPEED



2 Men + 1 Cyclone = 16 Men

IN the plant of the Globe Malleable Iron and Steel Company, Syracuse, N. Y., two men use a Cyclone Hoist to lift and deliver 5000 lbs. of steel bar stock to the shearing tables in less than a minute.

It would take 16 men to do the same job by hand labor alone!

This Cyclone Hoist has now been in service 4 years! The actual dollars and cents saving accomplished by the Cyclone on this one simple operation runs into a big figure. Cyclones always show surprising savings whenever they replace "strong-arm" material handling methods, *in all lines of industry!*

Distributors everywhere to aid you in laying out hoisting systems and submit estimates. Catalog covering our 1 to 40 Ton Cyclone Hoists, Cranes, Trolleys, and Overhead Track Systems sent on request.

The Chisholm-Moore Mfg. Co.
Cleveland, O.

Branches: **New York, Chicago, Pittsburgh**

Hoists Cranes Trolleys
Overhead Track Systems

Stop the snarling

The men who drive your car have to endure the snarls of truck drivers and jaywalkers.

But you can set them free from the worry and irritation caused by snarling, grinding timing gears.

Banish the Noise

Celoron Silent Timing Gears banish that bothersome noise. Doing away with the contact of metal on metal, they remove the cause of the noise.

Celoron Silent Timing Gears are non-metallic. They eliminate snarls, grinds, and howls. They retain positive, accurate timing. These gears, cut and molded, are tough, light, and strong.

Celoron Silent Timing Gears can be used in any timing gear set. They are standard equipment on many popular cars.

Celoron is a laminated phenolic condensation material bonded with condensite. It is water-proof, grease-proof, oil-proof.

Celoron is the silent gear material that *does not swell.* By a special treatment, any increase in the thickness of the material is prevented.

Quiet the Timing Gear Train

During the past two years Celoron Silent Timing Gears have been installed in more than a million cars by manufacturers and repairmen. The shrewd automotive experts know that Celoron Silent Timing Gears, properly mated and installed, cannot cause noise in the timing train.

Before you deliver this month's allotment of cars, put snarl-proof timing gears in every car. Drop us a line now for complete information that has influenced many manufacturers to standardize on Celoron Silent Timing Gears.

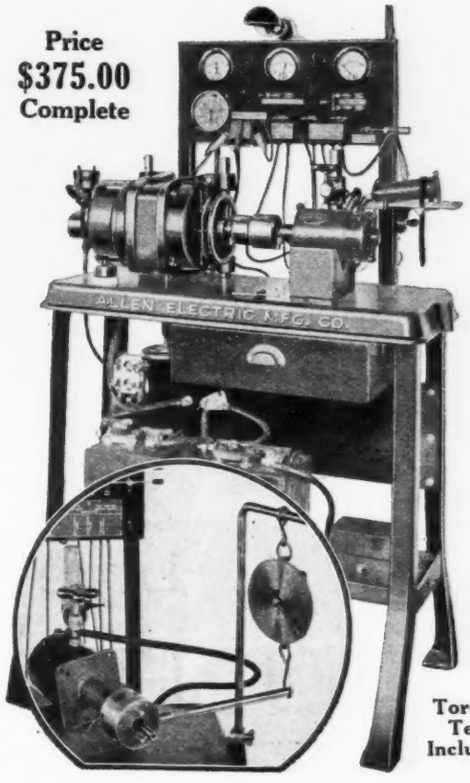
DIAMOND STATE FIBRE COMPANY
Bridgeport, Pennsylvania

Offices in Principal Cities
Toronto, Can. London, Eng.

CELORON SILENT GEARS

ALLEN TOOLS EQUIPMENT

Price
$375.00
Complete



Torque Test Included

CARS THAT ARE SOLD MUST BE SERVICED

Expansion by the car manufacturers calling for even bigger production has a very definite meaning for all dealers.

ALLEN UNIVERSAL TEST STAND

really complete as an electrical testing unit, is the most valuable piece of equipment in a shop and the most profitable.

Full details in Catalog
Send for it today

ALLEN ELECTRIC MFG. CO.

2204 W. FORT STREET DETROIT, MICH.

ALLEN
TOOLS - EQUIPMENT

Motorists Won't Kick About the Bill for Counterboring Valve Seats

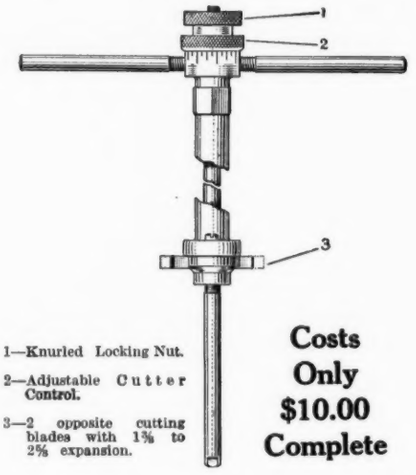
—if you keep the time charges down with this special tool.

Show every motorist who brings in a valve grinding job how the latest engineering practice secures tighter valve closure by narrowing the valve seats to increase the pressure per unit surface. Then take advantage of the speed and accuracy of the Lipe Counterborer to give him a quick, reasonably priced job.

The Lipe will do a 6-cylinder job in 40 minutes, as accurately as if you had set the bloc up in a drill press.

Its range from 1⅜" to 2⅝" makes it universal. Adjustment is instantaneous. The blades are easily reground.

It is furnished with 3 pilot rods, ⅜, 5/16 and 7/16, packed in carton with full directions, for $10.



1—Knurled Locking Nut.

2—Adjustable Cutter Control.

3—2 opposite cutting blades with 1⅜ to 2⅝ expansion.

Costs Only $10.00 Complete

Manufacturers

R. N. Roach Company

Rialto Bldg., Dept. M, San Francisco, Cal.

The Lipe Adjustable Valve Seat COUNTER BORER

Las-Stik TUBE PATCH These publications are carrying the Las-Stik 1924 advertising **Las-Stik TUBE PATCH**

Largest advertising to owners Largest Retail Sales. Best sales helps for dealers. Write for plan

Give Jobber's Name

LAS-STIK PATCH MANUFACTURING COMPANY HAMILTON, OHIO, U. S. A.

Colonial
CYLINDER HONES
With Dial Gauge

These tools have been redesigned and are now in greater popular demand than ever before. Concave cutting stones are an **exclusive, patented feature.** This eliminates all chance of the stone losing its cutting edge by filling up. This feature is one of the most important ever designed into a cylinder hone.

Increased production has permitted us to cut our list prices in half. These new prices make Colonial Cylinder Hones an exceptionally good buy for any shop. Three sizes are made —No. 1 for bores from 2¾" to 3⅛", No. 2 from 3¼" to 3⅝", No. 3 from 3¾" to 4½".

They can be used with a standard half inch electric drill. They are self-centering, absolutely automatic and require no adjusting. The "glassy" finish they produce makes "wearing in" unnecessary. Any mechanic can turn out expert work.

The Colonial Ames Dial Cylinder Gauge can be read by anyone—results are shown on the dial. It tests for straightness, roundness, size and scores in the cylinder.

You can't afford to be without these famous tools at the new low prices shown below. Order from us direct, mentioning your jobber's name, or write for complete details.

New Prices	
No. 1 Hone	$17.50
No. 2 Hone	17.50
No. 3 Hone	17.50
Dial Gauge	17.50

COLONIAL GEAR & MFG. CO.

KALAMAZOO, MICH.

NOW—
Leather Fan Belts

NOW is the time to sell Graton & Knight Leather Fan Belts. Everywhere you read "Nothing takes the place of Leather." More than ever before drivers are coming to know that for honest wear, for grip and pull, for a belt that will hold its shape, that will give perfect performance and keep it up day after day and month after month —"Nothing takes the place of Leather."

This display case was designed to sell Graton & Knight Leather Fan Belts for you—designed to tell your customers that you have fan belts that they put on and forget.

A Graton & Knight Leather Fan Belt is forty per cent and up more efficient than any fan belt made of a substitute for leather.

When you write your jobber about the Graton & Knight Display Case, ask about the Graton & Knight Link "V" Fan Belt too. It is as indestructible as a fan belt can be made, noiseless in operation and easy to make endless. Write your jobber now while you think of it.

GRATON & KNIGHT
WORCESTER, MASS.

GRATON & KNIGHT

Nothing takes the place of Leather

The Life of a Gear—
Is in the Strength of Its Teeth!

Every tooth in a Huetter Fly-Wheel Gear Band is uniform. Nothing but hard, tough steel is used in making them. All bands are electric welded at the seam. They are cut to Eclipse Bendix Drive Specifications which assures quiet, positive meshing during the entire life of the car. The exclusive Huetter feature of *universal and interchangeable pointing* enables you to install the same gear on several cars regardless of which side the starter pinion enters from. This feature allows you to decrease your investment without reducing the efficiency of your stock. All Huetter Gears are stamped "clutch side" thereby eliminating the possibility of reverse installation. The Huetter shipping service is the best—order direct. Our nearest distributor will deliver at once.

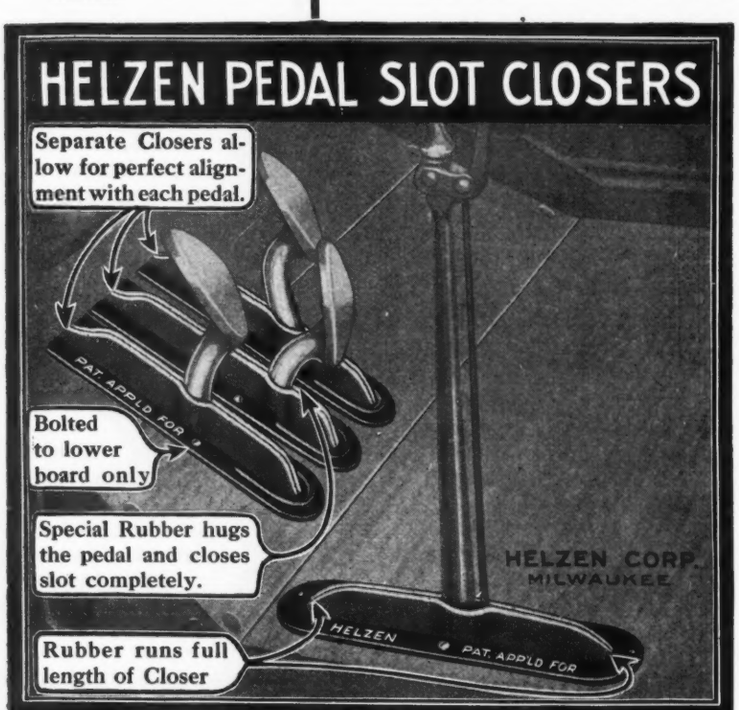
Huetter's Fly-Wheel GearBands

Write for catalog and prices. Convenient location of Huetter distributors means a saving of time. Order direct.

HUETTER MACHINE & TOOL CO., 546 Kentucky Ave., Indianapolis, U. S. A.

Wherever you find Fords, you will find Helzens.

Here's Solid Comfort for the New Year


HELZEN PEDAL SLOT CLOSERS
Separate Closers allow for perfect alignment with each pedal.
PAT. APPLD FOR
Bolted to lower board only
Special Rubber hugs the pedal and closes slot completely.
HELZEN CORP. MILWAUKEE
HELZEN PAT. APPLD FOR
Rubber runs full length of Closer

No cold drafts come up the pedal slots to chill the car and make driving uncomfortable once these Helzen Pedal Slot Closers are installed.

Rubbers fit snugly about the pedals, run full length of the slots and close out the cold and dampness of winter weather completely. In no way do they interfere with the operation of the pedals, or the removal of the floor board.

Easy to install. Adds immensely to the pleasure of winter driving.

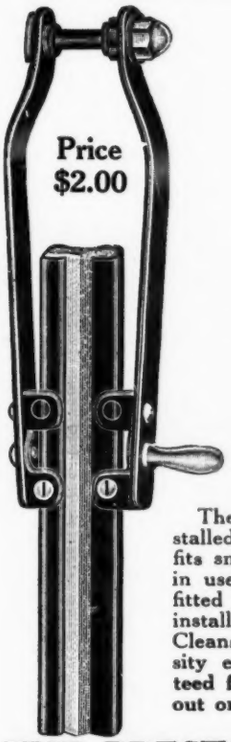
Price per set $2.25

For all Fords, Type A is for Coupe, Roadster, Touring Car or Truck. Type B for Sedan only.

Exclusive Sales Representatives

Ask your dealer. Dealer write Jobber or us.

THE FULTON COMPANY Dept. 15-H, Milwaukee, Wis.



AT THE CHICAGO SHOW—BOOTH 167 COLISEUM

NEW MODEL
STANDARD

Presto-Felt

The Only Chemical
WINDSHIELD CLEANER

Nationally Advertised—Demand Created—Unexcelled in Price Value

RAPID TURN-OVER AT A LONG MARGIN

New 1924 Features

New design oil tempered springs for permanent cleaning pressure.
Rubber Strip with outside slide to aid cleaning.
New easy grip handle.

The Presto-Felt Standard is easily installed on any type car—open or closed—fits snugly up to top of frame when not in use. Special joint giving free action, fitted with clamp and brass bushings for installation on the frame or through it. Cleans both sides of the glass—a necessity especially in closed cars. **Guaranteed for the life of the car not to wear out or lose its efficiency.**

Write for FREE Samples.

THE PRESTO-FELT COMPANY

Manufacturers of
Presto-Felt and Presto-Rub Windshield Cleaners and Presto-Fit (non-vibrating) Rear View Mirrors
WAUKEGAN, ILLINOIS

CORRECT SALES POLICY

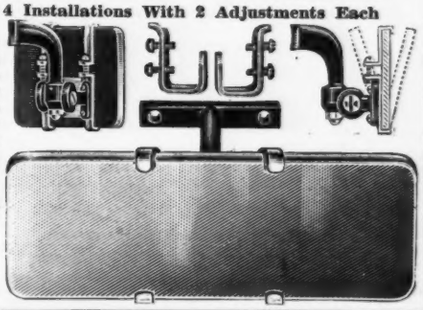
We cooperate with our jobbers and dealers with attractive advertising and sales helps to assure increased consumer demand. We make shipments promptly in cartons and packages that are attractive and convenient to handle. We sell only to those who are recognized as upholding prices that give profitable margins. Write for samples; terms and discounts.

PRESTO-FIT DELUXE REAR-VIEW MIRROR

One Bracket Makes 4 Installations With 2 Adjustments Each

For any type of open or closed car. Stout, rigid bracket transmits no vibration. Adjustable by hand to any angle without resetting bolts or screws. Extra heavy. French plate glass, rounded corners and edges. Brass mirror clamps heavily nickel-plated, and brackets for open car installations.

Price $3.00



Look at These Lathe Prices
! ! ! !

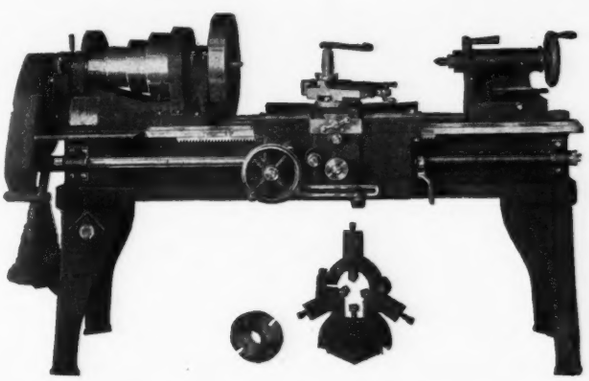
BARNES 18″x 6 ft. Lathe $450.00
18″x 8 ft. Lathe 475.00
18″x10 ft. Lathe 515.00

These prices are cash with order and f. o. b. cars, Rockford. We also make 9-11 and 13 inch swing lathes from $115 to $290.

This 18″ Barnes Lathe swings 18″ over bed ways; has 1⅝″ hole in spindle; cuts threads 1 to 56; takes 3″ wide belt on cone; large step of cone 10″ diameter; has automatic crossfeed; 4 changes of feed in apron without changing gear. Workmanship and material of the best.

W. F. and John Barnes Co.

439 Ruby St.
Rockford, Ill.



Send for Catalog

Dunn Hot Dome Short Manifold

For Chevrolet Superior and 490

At the first few explosions the Manifold Dome gets sizzling hot from the exhaust gas passing through the Dome Cap. The spray of gas from the carburetor nozzle is forcibly thrown against this intensely hot dome and it breaks up completely, delivering a dry highly explosive gas.

Cold weather starting is easy and mileage is greatly increased. No need to be continually pulling the choker—no more flooded cylinders, wet plugs and diluted lubricating oil. Factory tests obtain 38 miles per gallon. Owners can reasonably expect 25 to 35.

The Dunn Hot Dome Short Manifold is easily installed. No change in original controls. All necessary bolts and fittings furnished. Retail price $7.50 with liberal discount to dealers and jobbers.

Money back in thirty days, if not satisfied.

Dunn Manufacturing Co.

106 Main St. Clarinda Iowa, U.S.A.

KING QUALITY

JOBBER is known by the kind of replacement parts he handles.

KING QUALITY
ALL THE NAME IMPLIES
AUTOMOTIVE PRODUCTS

PISTON PINS

PISTON PIN SET SCREWS

STEERING KNUCKLE BOLTS AND BUSHINGS

TIE ROD BOLTS AND BUSHINGS

AUTOMOTIVE DIVISION
KING SEWING MACHINE COMPANY
BUFFALO, N. Y.

Have You Ever Used a

Vise Type

Battery Terminal?

works like a vise

FREE

Try one with our compliments. When writing tell us from whom you buy your battery replacement parts.

O P's "4-in-one"
Elbow Vise Type Battery Terminal

Just hit this stud with a hammer when frozen or badly corroded and OFF SHE COMES! Big time and labor saver. No need of laboring with chisel or terminal pullers.

Ask Your Jobber for "OHIO" Terminals and Battery Equipment.

AUTOMOTIVE OHIO PARTS IF YOU SEE O-P THEY ARE OK

Your Jobber stocks "OHIO" Service Station Equipment.

THE OHIO PARTS CO.

3305 Colerain Ave. Cincinnati, Ohio

STOP END-PLAY

IN THE FORD CRANK-SHAFT

WITHOUT "PULLING" THE MOTOR—THE

C-A Adjustable Bearing

—presents a new and better way of stopping Ford crankshaft end-play. A cheaper, easier method that POSITIVELY corrects this cause of hard starting, poor lights, knocking and the many other troubles due to destructive end-play. A real quality device. Easily and quickly installed—leave the motor in and simply drop the oil pan. Let us tell you how to stop end-play without "pulling" the motor.

ADJUSTABLE BEARING CO., Inc.
Dept. 401 BRAZIL, INDIANA

C-A ADJUSTABLE CENTER BEARING CAP

WRITE TODAY

PRICE **$3.75**

JOHNSON PISTON —PIN— BUSHINGS

There's a complete price list of Johnson Piston Pin Bushings in both January, 1924, Directories. You don't have to write for price list — it's right there on your desk. MARK THOSE PAGES NOW.

Johnson Bushings are standard factory equipment for a great many of the finest makes of motor cars.

Order Johnson Bushings from the salesmen of leading automotive replacement parts jobbers.

JOHNSON BRONZE CO.
New Castle, Pa.

A New Usaco AIR COMPRESSORS Air Compressor

The World's Best Air Compressor *Made Better Than Ever Before!*

Choose from Several Equipments all Bearing the New Compressor Unit

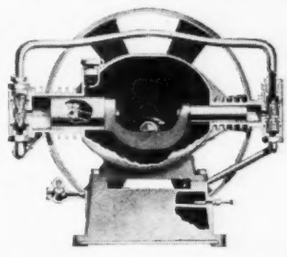
"STANDARD" DE LUXE
Displacement, 3¼ cu. ft. per min.; Motor, ¾ H. P.; Dimensions, 52x20x39 in.; Tank, 30 gallon capacity for 200 pounds working pressure; Net weight, 420 pounds.

SOME years ago this company Pioneered the way by introducing an air compressor of new design which has since become generally recognized as the unquestioned leader — a machine that has been widely imitated but never equalled.

Now, we are blazing another trail in the introduction of a new machine—the same in fundamental principles but as far superior to the previous compressor as the original model was then in advance of the field.

Of definite interest are: **The Plate Valves** of new and simplified design, which result in increased efficiency; the **Regulated Pin Splash Oiling System**, a greatly improved method of lubrication; the **Rigid Piston Assembly**, an exclusive feature that results in long life; the **Improved Copper Intercooler** of original and simplified design and other features that make it, without question, the most efficient, most quiet air compressor ever designed.

Air compressor users, tire dealers, filling station operators and jobbers, don't buy a single compressor until you get the complete story of this remarkable machine in the new catalogue just off the press. Send for it today.



Please send literature on new compressor, also new Catalog advertised in Motor Age to—name written in margin

The United States Air Compressor Co.
5304 Harvard Ave., Cleveland, O.

ONE of the old reliable adjustable wrenches made better by the new patented STA-SET feature. Automatically locks to any adjustment — hangs on with a bull dog grip—and stays set until another adjustment is desired. The STA-SET sells upon sight and returns a generous margin of profit. **A truly great wrench!** Four sizes; two finishes.

Write for illustrated folder and price list, giving jobber's name.

HJORTH TOOL CORPORATION
JAMESTOWN, N.Y.

for profit, sell

HOESS
Humanized
Piston Rings

Breathe with the Motor

HOESS BROTHERS, Hammond, Ind., U. S. A.

Test These Battery Plates at Our Risk—

Beat competition to these improved plates

25% More Capacity
30% Longer Life

We want you to test Continental Dehydro Plates and see for yourself just how great an improvement they are over ordinary plates and what an advantage their use gives you over your competitors. We know that the new process by which they are made gives them 25% greater capacity and 30% longer life. But we want you to see for yourself. Don't take our word for it; try them—make your own tests, convince yourself.

SPECIAL OFFER—Enough for Battery

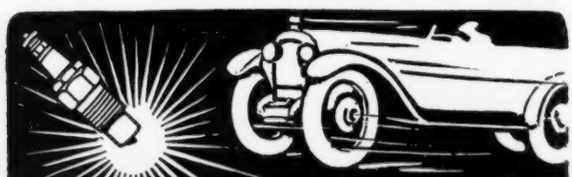
We will send you on trial 18 negative and 15 positive plates—enough for one 33-plate battery. Try them. If, after 30 days, they have not lived up to our claims, return them and we will refund your money without argument and without delay. The price is $5.00, shipping charges prepaid. You take no risk in trying out the first basic improvement made in battery plates in 40 years. SEND THE COUPON NOW.

CONTINENTAL BATTERY CO.,
3201-19 Papin Street, St. Louis, Missouri.

CONTINENTAL BATTERY CO., 3201-19 Papin St., St. Louis, Mo.

Gentlemen: I am willing to try your Dehydro Plates. I am enclosing $5.00 (you pay transportation) for enough standard size plates to make one 33 plate battery. If I am not satisfied, you are to refund my money in full upon return of the plates.

Name .....
Address .....
My Jobber is .....



Be an Automotive Electrical Expert

CASH IN ON AUTO ELECTRICAL SERVICE

Automotive Electrical repairing is profitable. The more efficiently this work is handled, the more profit. Know how to tackle the most difficult jobs and solve the knottiest problems quickly and accurately. Then Automotive Electrical repairing will pay you profitably. Over fourteen million cars demand this service, are you getting your share?

Few shops can handle this work at all, and only about one in ten can give electrical service properly. The field is open—prepare yourself for it, and go after business.

PREPARE IN 3 MONTHS

Study in our big school in the dull months, and prepare for the spring rush. We teach all phases of this work thoroughly on the actual equipment of all existing makes and you can qualify in the short time of three months.

Our students must know Automotive Electricity before they graduate. That's why our graduates are so successful. Investigate today—write for our interesting booklet. Sent Free.

School of Automotive Electricity, Inc.

Associated with the
SCHOOL OF ENGINEERING OF MILWAUKEE
Dept. M. A.-415 Marshall St., Milwaukee, Wisconsin

SPEEDY, Accurate Repair Work

The DICKERSON PISTON VISE

firmly—tightly holds PISTON with no danger of breakage or distorting shape.

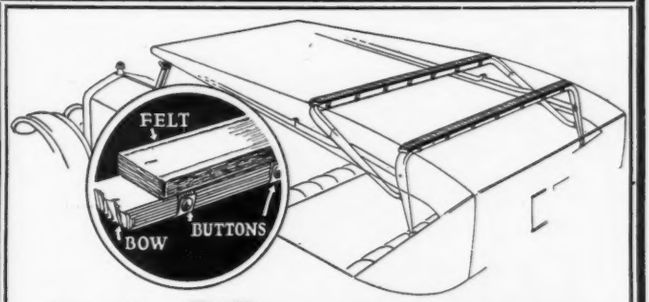
Every piston operation, from fitting to assembling connecting rod, piston pin and rings, is done without removing piston from vise.

Adjustable through a complete circle by turning knurled hand-nut. Action instantaneous. Strongly made—accurately machined—a great time saver.

Write for catalog today.

DICKERSON
Garage Jacks
Air Compressors
Shop Equipment

Made by
C. A. Dickerson Compressor Corp.,
Buffalo, N. Y.



Sell NEVERWEAR

Make the Top Outlast the Car

Auto Top Protectors

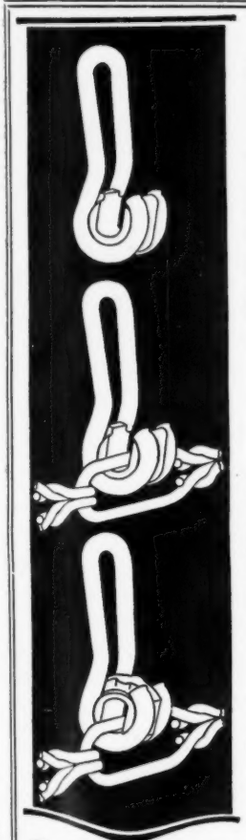
To Prevent Split Tops

Snap the thick felt pad of the Neverwear Auto Top Protector on the bows of every car that stops at your place. Earn a good profit. It's easy: just tell 'em they'll never have a split and leaky top. They'll buy. At a dollar and a half a pair you can sell out almost before the bill comes due.

Representatives

If you have a good acquaintance among the jobbers and dealers of the East or Middle West, we can make you a proposition that pays a mighty good income. Write for the details.

AUTO TOP PROTECTOR CO.
Thomaston, Ala.



The Handy Quick Replacement Fastener

SURE SALES WINNERS

Live wire dealers are ever on the lookout for improved equipment that wins sales through its appeal in time and labor savings and convenience.

ARROW GRIP CHAINS

For Pneumatic Tires

Fill all requirements as desirable stock. Quick Replacement Fasteners place them at the head of the chain field. Satisfactory, dependable, quick selling. Fasteners may be sold separately for use on other chains.

Ask Your Jobber or Write for Literature

ARROW GRIP MFG. CO. Inc.
106-126 Cooper St.
GLENS FALLS, N. Y.

Export Office: 280 Broadway, N. Y.

Detroit Tire Lock

$5.00 LIST

INSTALLED IN A MOMENT

One big reason Detroit Tire Lock is easy to sell is the fact that anyone can install it on his carrier in a moment.

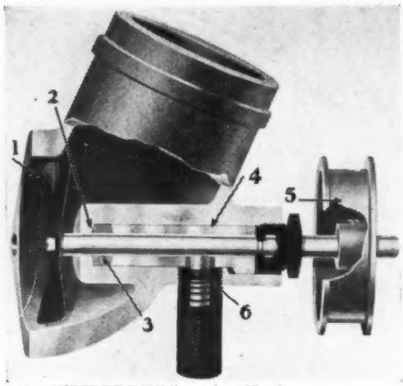
Part A is bolted onto the carrier, the bolt coming through at X.

Part B then snaps on over A and is locked, the whole operation taking but an instant.

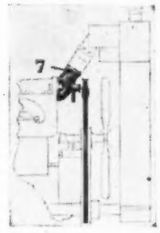
Our merchandising plan will interest Distributors and Jobbers.

DETROIT CARRIER & MFG. CO.
8639 Conant Road **Detroit, Mich.**

Pumps 12 Gallons Water per minute



1. "IMPELLER" scientifically constructed and Rustproof.
2. The only pump that has a seal to prevent water from entering bearing.
3. No water is sealed in the bearing thereby allowing perfect lubrication.
4. Special alloy bearing.
5. Flat belt pulley.
6. "Wick Oiler and Well" feeds oil automatically as pump needs it.
7. The pump installed—requires only 20 minutes to install.



'CIRCULEX"

Positive Water Circulation

A new and distinctive pump for Ford Cars. The only pump that seals the water from the bearing, thereby allowing perfect lubrication by Wick Oiler.

EVERY PART RENEWABLE

Order from your jobber—

Price complete with belt $3.90

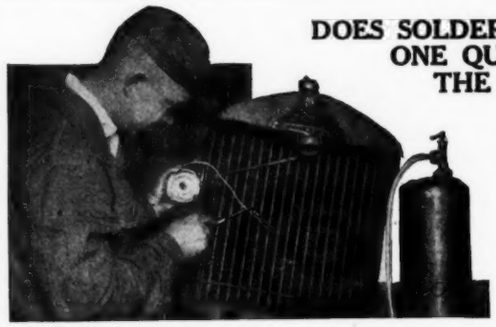
PRICE BROS., INC.

FREDERICK MARYLAND

WESTERN REPRESENTATIVE
Roland S. Boreham
600 Metropolitan Bldg., Los Angeles, Cal.

CENTRAL REPRESENTATIVE
Hal Taylor Company
1523 Republic Bldg., Chicago, Ill.

At a Speed of 18 M.P.H.



DOES SOLDERING IN ONE QUARTER THE USUAL TIME

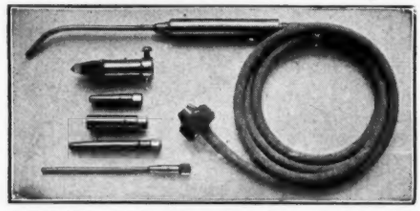
TORIT TORCH OUTFIT No. 13

Whether the job is lead burning, battery sealing, fender straightening, radiator soldering or loosening a rusty or corroded nut, the Torit, No. 13, torch is always ready at a second's notice to serve you, and the price is wonderfully low. It is handy for soldering tinware, babbitting, joining light tubing, aluminum soldering, soldering electrical connections, etc.

USES ACETYLENE ONLY

A splendid use for discarded auto acetylene tanks. Many owners make the Torit, No. 13, pay for itself in a single day. Torch, with 4 different tips, soldering copper, 5 ft. tubing and connection for auto acetylene tank.

$7.50



ORDER YOUR TORCH TODAY

St. Paul Welding & Mfg. Co.

169 W. Third St., St. Paul, Minn.

This Growler Costs But $4.50

With it you can tell in ten seconds whether an armature is in good condition. If it is not, you are saved all the grief of having to do the whole job over, losing all your profit and the customers' goodwill besides. Operates on 110 Volt A. C. Current.

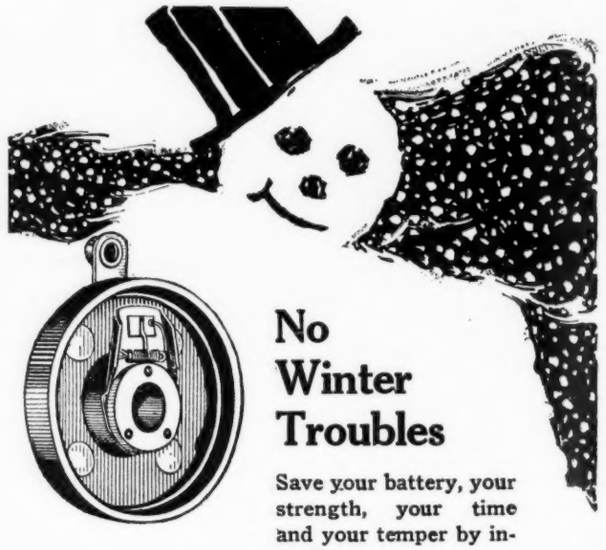
Sold direct or through your jobber. Resale price $4.50 in Central and Eastern States, $5.00 in Pacific States. Your check for above amounts plus twenty-five cents postage brings this moneymaker to you.

ARMATURES: We rewind any and all kinds of GENERATOR, MOTOR and MAGNETO armatures, and reship same day old armatures received.

FORD GENERATOR AND MOTOR ARMATURES	$ 1.50
ALL SMALL DOUBLE UNIT GENERATOR AND MOTOR ARMATURES	5.00
SINGLE UNIT MOTOR GENERATOR ARMATURES	10.00
MAGNETO ARMATURES	$3.75 to $4.75

Armature Rewinding Co., Inc.

3301 Washington Blvd., St. Louis, Mo.



No Winter Troubles

Save your battery, your strength, your time and your temper by installing

The BELL Timer

Bell-equipped Fords chuckle at wintry blasts. Their motors start and run with midsummer pep. No oil in this timer to gum up—smooth wipe contact and big hot sparks, always. Solid copper and solid bakelite, precision made.

Sold by leading jobbers and dealers.

Bell Manufacturing Co.

13 Elkins St.

Boston Mass.

ACCURATELY DALL MACHINED

SEMI-STEEL REPLACEMENT PISTONS

ACCURATELY DALL MACHINED

For replacement work after a rebore or re-grind job insures your customer as good if not a better job than the original assembly.

Dall Pistons are simply GOOD Pistons, made to manufacturer's specifications, sometimes more refined in design and lighter in weight, but always as carefully made and inspected as though they had to pass the most rigid inspection of a Motor Manufacturer.

Dall Pistons are regularly furnished in standard and various oversizes, also semi-finished 1/16 oversize.

Write today for price list and delivery schedule on all items. Distributors at various points will take care of your requirements.

THE DALL MOTOR PARTS COMPANY
Post Office Station D, Cleveland, Ohio
Southwestern Branch
THE CARROLL CO.
2218 S. Harwood St., Dallas, Texas

"I Asked Him How He Liked It"

He was a garage man. He was putting oil into my car with a Brookins Measure. I said: "How do you like it?" And he said: "It's the only real oil measure I've ever had. I not only use it all the time but a lot of my customers buy one for themselves. They can see how good it is at a glance."

The convenient, time-saving, oil-saving Brookins Measure is a trade builder for jobbers. It pays a good profit and it wins the good will of your trade.

Write today for sample and trade prices.

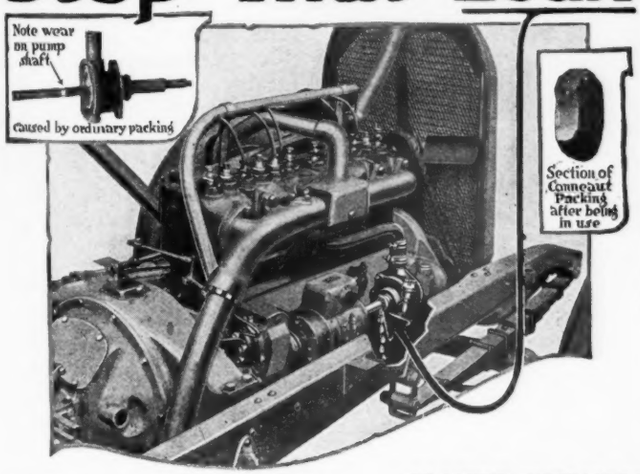
The Brookins Measure is made in one-quart, two-quart and gallon sizes, all copper finished. All sizes have the flexible metal nozzle that reaches any oil intake without the use of a funnel, and the thumb valve that controls the oil flow instantly and positively. These are distinctive Brookins features.

THE BROOKINS MFG. CO.
238 Bayard St., Dayton, Ohio

Export Office, 11 Broadway, New York City. Cable Address "Brookins" New York, All Codes Used.

Brookins OIL MEASURE

Stop That Leak



"Conneaut" PLASTIC METALLIC PUMP PACKING

Will Stop it Forever

Conneaut packing puts a permanent stop to water pump leaks. Plastic in form—you mold it with your fingers to fit any size stuffing box.

Makes an adjustable smooth metal bearing—practically frictionless—Good for years of service. Will seal pump shafts TIGHT even after they have become worn and won't respond to other packing methods.

JOBBERS: There is no material you can handle with more satisfaction and profit than Conneaut Plastic Metallic Packing.

We furnish attractive cartons and give selling assistance. Write us today for full information.

THE CONNEAUT PACKING CO., Conneaut, Ohio

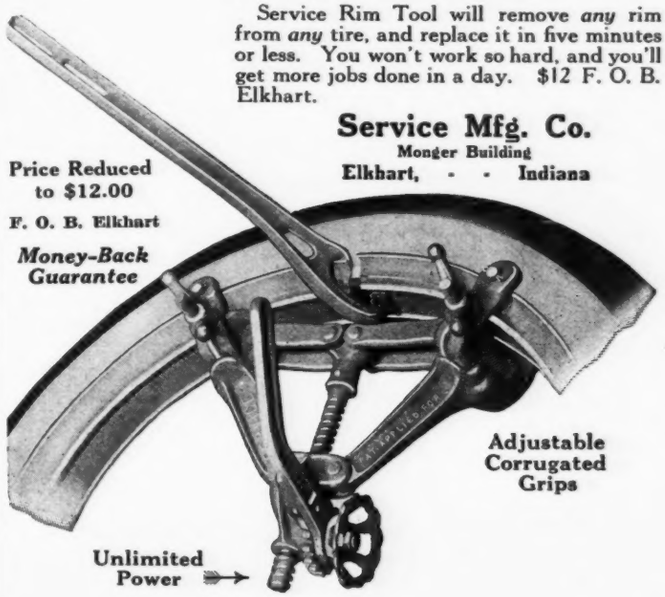
Service RIM TOOL

The well-equipped shop gets the business. When customers find you do not batter and spring their rims with hammer and bar, your shop will get the business.

Service Rim Tool will remove *any* rim from *any* tire, and replace it in five minutes or less. You won't work so hard, and you'll get more jobs done in a day. $12 F. O. B. Elkhart.

Service Mfg. Co.
Monger Building
Elkhart, - - Indiana

Price Reduced to $12.00
F. O. B. Elkhart
Money-Back Guarantee



Adjustable Corrugated Grips

Unlimited Power

The Strength of a Giant With the Will to Obey

The Pacific Rim Tool has a preponderance of strength yet it is always under perfect control and is as gentle as can be in the manner in which it removes the rim.

Every now and then we learn of someone who damaged a good rim by using a rim tool unqualified for the task. It's no cinch job and therefore requires a tool like "Pacific" with its Jack-screw leverage, adjustable hinges, and all around good workmanship.

The Pacific Rim Tool

Now $10.00 list price

Manufactured by

PACIFIC RIM TOOL CO.

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WHEREVER you are, Milwaukee Bearings are "not over a day away"! Four hundred distributors—covering every state in the Union—are ready at a moment's notice to serve you from complete stocks of "Milwaukees".

Did you ever have a customer who didn't want his car in a hurry? They all do! And right here is where Milwaukee Bearings keep promises for you.

And they're real bearings, too—virgin metal, ten times micrometer tested. Get our FREE car, truck and tractor list, with name of jobber stock nearest you.

Milwaukee Die Casting Co., Milwaukee, Wis.

MILWAUKEE BEARINGS

IN CLEVELAND- IT'S THE

HOLLENDEN

Not Expensive

ROOMS—
Large comfortable and well-furnished:
83 Rooms, hot and cold running water, $2.50
210 Rooms, single with bath, $3.00 - $3.50
192 Rooms, with bath - - - - - $4.00
160 Rooms, double, with bath, $5.00 - $6.00
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BREAKFASTS—Club Breakfasts with generous portions at 65c, 75c and $1.00.

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DANCING—Dinner Dancing with Carl Rupp's Hollenden Dance Orchestra every evening excepting Sunday. *No Cover Charge.*

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Selling trucks and buses is easier when you know the owner's viewpoint

Read *Motor Transport.*

It tells you the problems of the Fleet Owner. It tells you how Fleet Owners are making and can make a success of truck or bus operation.

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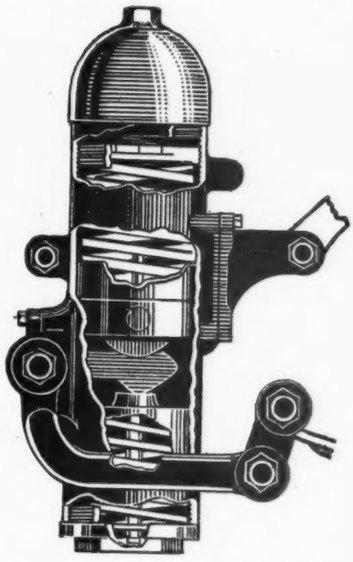
Motor Transport is published semi-monthly, on the 1st and 15th. The subscription price is $2.00 per year ($2.50 West of the Mississippi).

Write for a sample copy.

Motor Transport
FORMERLY COMMERCIAL VEHICLE

(Published by the Class Journal Co.)

239 West 39th St. New York, N. Y.



A shock absorber that is absolutely right in action, results, and price.

Have you our latest booklet?

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JOHNSON Direct Jet Gas Appliances

For

Heat-Treating

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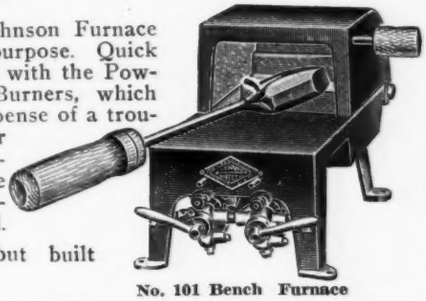
Metal-Melting

Do not Require a Forced Air Blast

No. 8 Adj. Torch

There is a Johnson Furnace for every shop purpose. Quick acting and fitted with the Powerful Johnson Burners, which eliminate the expense of a troublesome blower system. Just connect the Furnace with the gas supply and go ahead.

Inexpensive, but built for hard usage.



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State your needs and we will be glad to specify the most economical style.

JOHNSON GAS APPLIANCE CO.
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You Can Forget That Joint Forever If You Pack With

TRADE
TENAX
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SHEET PACKING
Compressed Asbestos

Men who once use Tenax prefer it to all other Compressed Asbestos Sheet Packings. A quality packing—proved so by its long life and splendid performance. Tenax has been used consistently for 20 years.

Ask for Tenax, the "Original Blue Sheet." In size 50x50 in. from 1/32 to ⅛ in. thick. Also in black graphited sheets 1/64 in. thick.

If your jobber doesn't handle Tenax, write us for information and name of most convenient source of supply.

Advance Packing & Supply Co.
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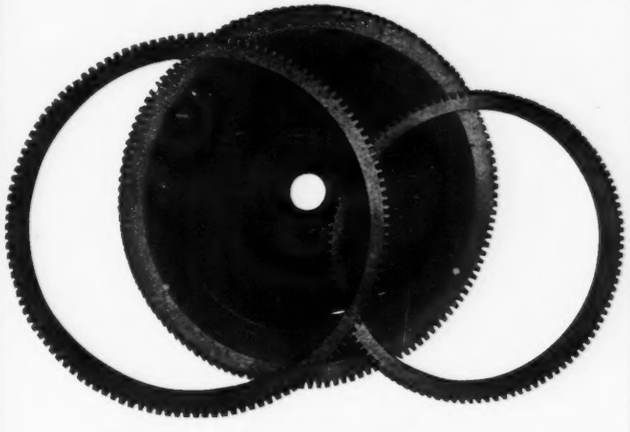

New Low Prices On Fly Wheel Rings

Increased quantity production has enabled us to get out a new and lower price list on Meachem Steel Gear Rings for Fly Wheels. Also our trade discounts have been increased to more than offset the lower list prices. Write us for the new list and discounts.

The Meachem Gear Corp'n.
Ring Dept. Syracuse, N. Y.

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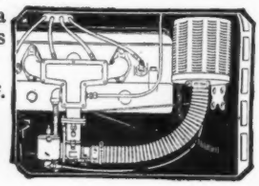
REG. U.S. PAT. OFF.

Perfect Positive Protection

Dealers sell more cars to prospects who come to them through the recommendation of satisfied owners than salesmen "dig" up. By eliminating engine trouble and enabling a car to run three to five times as many miles without attention, Protectomotor makes every owner a booster for the car he buys from you.



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Perfect, Positive Protection

THE PUBLIC KNOWS

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Standard of the Accessory World

APG AUXILIARY SPRING CO., Inc.,
DEPT. 4 BIRMINGHAM, ALA.

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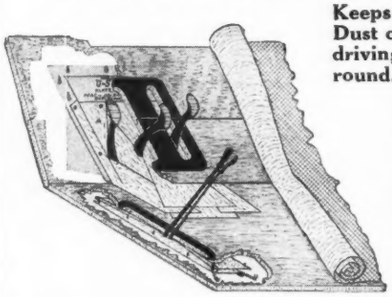

Keeps Heat, Cold, Mud and Dust out of the car. Makes driving enjoyable all year round.

A metal deflector that Ford owners want. Easily applied under floor boards where it's entirely concealed and eliminates rattling of boards. Does not interfere with pedals or brakes. A comfort to the driver. Lasts a lifetime.

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Jobbers, Dealers—Write for details!

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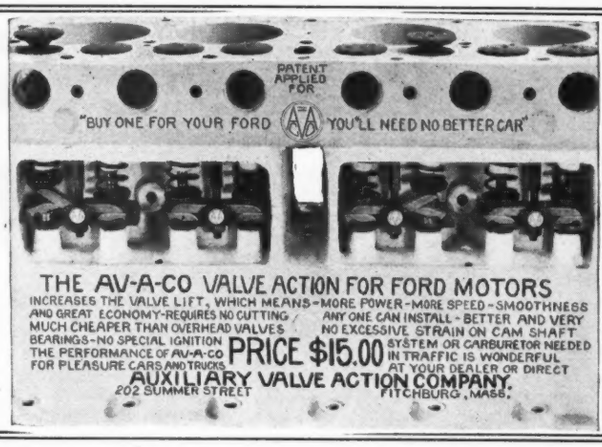
Our Re-babbitted Bearing Department is over two years old. Over 200,000 Con. Rods have been shipped. Less than one to each 2,000 have been returned as faulty. We have over 5,000 SATISFIED DEALERS in 16 States. We Re-babbitt ANY Bearing that has ever been Babbitted. Special undersize for Re-ground crankshafts 10 per cent extra.

A few of our LOW RETAIL PRICES are:—Marmon and Studebaker $4.00. Chalmers and Moline Tractor $3.50. Buick and Maxwell $3.00. Oakland and Olds $2.50. Fordson and Dodge $2.00. Fords 60c each. Liberal Discounts to Dealers and Garages. We pay Transportation one way. RUSH Orders shipped same day order received. Satisfaction guaranteed.

Fremont Foundry & Bearing Works
1340 W. 5th St., Oklahoma City, U. S. A.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"BUY ONE FOR YOUR FORD
YOU'LL NEED NO BETTER CAR"
THE AV-A-CO VALVE ACTION FOR FORD MOTORS
INCREASES THE VALVE LIFT, WHICH MEANS-MORE POWER-MORE SPEED-SMOOTHNESS AND GREAT ECONOMY-REQUIRES NO CUTTING MUCH CHEAPER THAN OVERHEAD VALVES BEARINGS-NO SPECIAL IGNITION THE PERFORMANCE OF AV-A-CO FOR PLEASURE CARS AND TRUCKS
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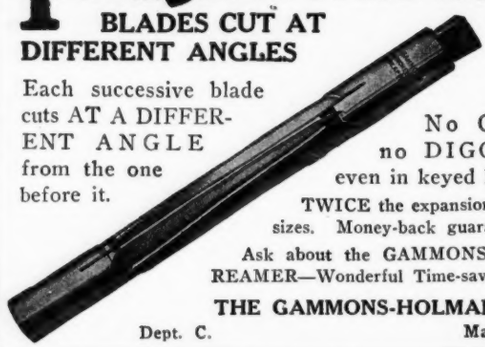
202 SUMMER STREET FITCHBURG, MASS.

PAROB EXPANSION HAND REAMER

BLADES CUT AT DIFFERENT ANGLES

Each successive blade cuts AT A DIFFERENT ANGLE from the one before it.



No CHATTER, no DIGGING IN—even in keyed holes.

TWICE the expansion of others. All sizes. Money-back guarantee.

Ask about the GAMMONS TAPER PIN REAMER—Wonderful Time-saver.

THE GAMMONS-HOLMAN CO.
Dept. C. Manchester, Conn.

REBABBITTING

WATKINS SYSTEM REBABBITTING ALL STATES SERVICE

You can be sure of quality work, S A E, specification materials and the right price if you send your connecting rods to a WATKINS plant for rebuilding and refuse imitations of

WATKINS SERVICE

New Bolts and nuts, laminated shims, bronze wrist pin bushings, are part of the rod rebuilding *at no extra charge.* Bearing tinned in rod and broached to mirror finish and to standard size cuts time on replacements and holds down labor costs on flat-rate repair jobs. Send your burned-out rods today. All rods shipped same day they are received.

Send Rods to Nearest Factory for Quickest Service

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Toledo, Ohio, Stewart-Burgan Co.
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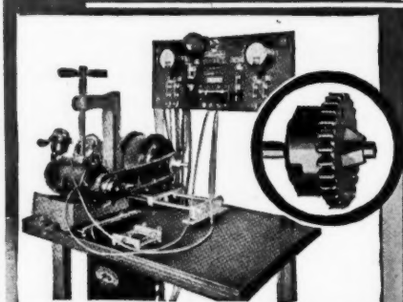
Waterloo, Ia., All States Rebabbitting Service.
Wichita, Kans., Home Office—The Watkins Mfg. Co.

EXCELSIOR TEST BENCH

With the Positive Drive and Speed Control



INCREASE YOUR PROFITS!

Starting, lighting and ignition pays bigger profits than any other branch of automotive service.

The Excelsior Test Bench

equips your shop complete for this work.

Price $385.00

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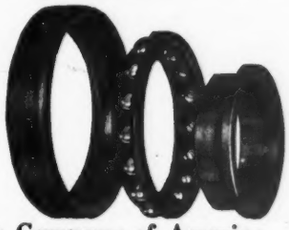
WEIDENHOFF 4350 ROOSEVELT ROAD CHICAGO, ILL., U. S. A.



The Bearings Company of America,
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Manufacturers of—Angular Contact Radial Bearings, Angular Contact Thrust Bearings, Thrust Ball Bearings. All Bearings made to your requirements and Blue Print dimensions. Your present Bearing sizes duplicated.

Western Sales Office
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Franklin

The
Air and Water Station
that makes free air pay

$58.50
f.o.b.
Norristown

A big Business getter for all garages and service stations. Stands 12 ft. 6 in. overall; glass-encased revolving head wired for an electric light; long air hose that will reach two cars without moving them. No springs to rust or lose tension. Order today from your jobber or write for full particulars.

FRANKLIN AIR COMPRESSOR WORKS
2604 Main Street, Norristown, Penna.

Are You Acquainted With This Insulator?

Spark plugs equipped with "775" are spark plugs that will give the best service. "775" in a spark plug is the surest indication of the maker's honest endeavor to put out nothing but the best. That's why the better spark plug manufacturers are glad to pay more for "775"—because it is the best insulator on the market today.
Write for a list of "775" users.

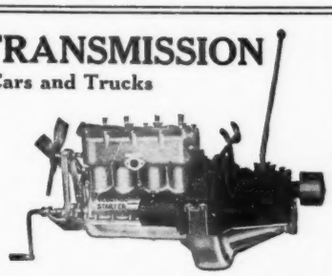
Frenchtown Porcelain Co.
Trenton, N. J.

"Established 1910—Busy ever since"

THE BETTER SPARK PLUG INSULATOR

SIMPLEX TRANSMISSION
for Ford Cars and Trucks

Three Speed Sliding Gear Type
MORE POWER
26 to 1 in low.
In our new type "CT"
"It will pull like everything."



This transmission has three speeds forward and one reverse and replaces the regular Ford transmission, drums, bands and all. The low gear is lower than the Ford, therefore more power, third is the same as the Ford and second is halfway between. It is ruggedly built with oversize alloy steel gears. Multiple disc clutch. Foot brake on jack shaft. Hyatt Roller Bearings. Installation easy, no cutting or machining.

E. D. & A. F. CRONK, Inc., 140 Hotel St., Utica, N. Y.

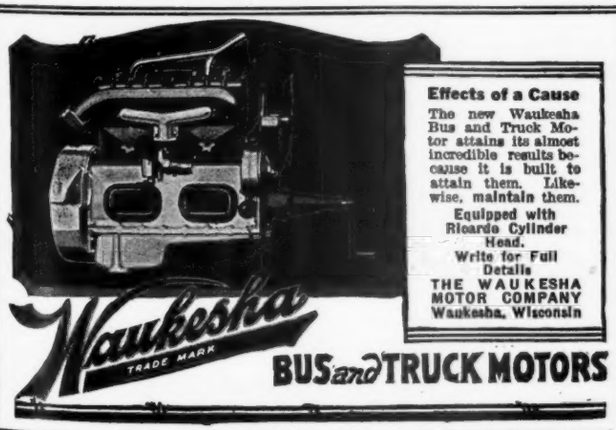
Get This "Pioneer" Garage Special

Electric Drill and Valve Grinder

Greatest time and money saver, as well as money maker, for your shop—

"It Will Do The Work"

Louisville Electric Mfg. Co.
Incorporated Louisville, Ky., U. S. A.
C. E. Willey, Pres. J. B. McFerran, Secy.-Treas.



Effects of a Cause

The new Waukesha Bus and Truck Motor attains its almost incredible results because it is built to attain them. Likewise, maintain them.

Equipped with Ricardo Cylinder Head.
Write for Full Details
THE WAUKESHA MOTOR COMPANY
Waukesha, Wisconsin

Waukesha TRADE MARK **BUS and TRUCK MOTORS**

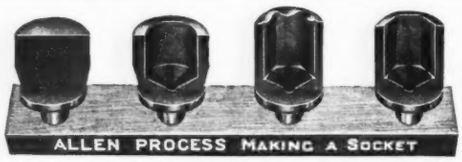
Diogenes

Diogenes, a Greek Philosopher, used to walk the streets of Athens 2300 years ago with a lantern in his hand.
On inquiry as to what he was looking for he used to say, "I'm looking for an honest man."
Through the ages his remark has been used as an example of humor and pessimistic futility.
Were he alive today he'd find his honest man in the old Anchor Bulb-maker.
And with an Anchor Bulb other honest men, which his old lantern missed, would be revealed to him. For buyers who are groping in the dark for an honest light at a low price we recommend.

ANCHOR
AUTO BULBS
"Triple-Tested Never Bested"

Anchor Electric Company
553 West Jackson Blvd., Chicago, Ill.

Cold-Drawn Sockets

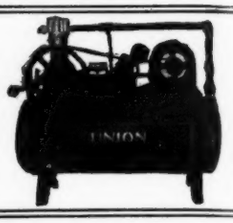


ALLEN Wrench Sets

The Allen Manufacturing Company, Hartford, Conn.

For Unusual Service

Union Air Compressor, Union for Service, Union for Strength, Union for Reliability. Built by Union Equipment Co., Butler, Pa. The best machine on the market for the money.



Union Equipment Company
Butler, Penn.

KLEENKAR

SHOP COVERS

The Greasy Steering Wheel

has lost many a paying job. Clothe wheels, fenders and cushions with Kleenkar shop covers. Then grease spots and scratched varnish will never cause you a complaint. Washable, non-shrinkable, long-lasting, you get the price back long before they wear out. Fender covers lined with fleece, so they actually polish while protecting. Send for samples.

Automotive Fabric Equipment Co.
703 Cass St. Milwaukee, Wis.

WEL-EVER OIL CONTROL PISTON RINGS

Less Oil and Gas—from WEL-EVER equipped units. Its oil control feature is guaranteed to stop oil pumping, prevent spark plug fouling and reduce carbon formation.

Write for interesting circular on oil pumping and details about this fast selling piston ring.

THE WELEVER PISTON RING CO.
1713-15 Canton St. Toledo, Ohio

PORTER REDI-CUT GLASS

For **Ford Replacements**

The finest quality hand blown triple strength crystal sheet glass cut to exact size and finished on one edge. Packed in a manner that minimizes breakage. Jobbers and dealers can carry stock with little chance of damage. Write for complete details.

PORTER MIRROR & GLASS CO., Fort Smith, Ark.
Automotive Division—3124 Locust Blvd., St. Louis, Mo.

Real High Tension Ignition for Ford Cars

Varley Transformers eliminate nearly all chronic ignition trouble. Save gas. Add power. Keep plugs clean. Stop misfiring. Save repairs. $2.50 each. Write for full particulars.

The Autocoil Co., Jersey City, N. J.

THREE PRODUCTS YOU NEED

ZIP FRICTION PASTE, for fitting in bearings.
ZIP GRINDING COMPOUND, for valves.
ZIP LAPPING COMPOUND, for lapping in pistons.

The Original Water Mixed. U. S. Pat. 1353197
Write For Samples
THE ZIP ABRASIVE COMPANY
THE ZIP MFG. CO.
Ask Your Jobber.
Cleveland, O.
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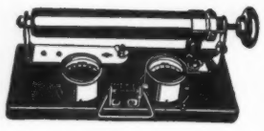
APPLEBY USED CAR PLAN

—the Solution of the used car problem!

Percy Chamberlain Associates
1320 Book Bldg., Detroit



TEST YOUR BATTERIES

by the Chart Method. Something New. Send for free booklet, today.

Allen-Bradley Co.
Electric Controlling Apparatus
281 Greenfield Ave., Milwaukee, Wis.

"It pays to buy a Kellogg"

KELLOGG COMPRESSORS

Rochester, New York

QUALITY—PROFIT—TURNOVER

American Hammered Piston Rings

American Hammered Piston Ring Company
Baltimore, Maryland

FEDERAL BUMPERS

Designed to answer the wants of the motorist. They provide the greatest protection to the car, yet their rugged strength is concealed by their lines of beautiful construction. They are the bumpers of today and tomorrow. Ask for Catalog No. 11.

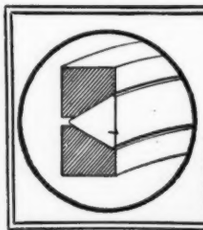
METROPOLITAN and BROADWAY MODELS
FEDERAL PRESSED STEEL CO., Milwaukee, Wis.
Jobbing Division: London Guarantee & Accident Bldg., Chicago.

Kelso Ever Ready

BRAKE LININGS and CLUTCH FACINGS

Always used where safety and service are the first and only consideration.

KELSO M'F'G CO., TRENTON, N. J.



Wedge-Rite piston rings are 3-piece rings following the best engineering practice. The patented wedge takes up the wear, keeping the groove and cylinder wall tight against oil and compression leakage. Wedge-Rite Piston Rings are made from the best individual castings.

WedgeRite — Plattsburgh, N. Y.

RELIO
The Van Norman
VALVO

Relio, an electric-drive wet grinder for pistons, pins, valves, bushings, $475.00.
Valvo, an electric-drive bench grinder for valves, valve-seat reamers $175. See page ads this paper.

Van Norman Machine Tool Co.
Springfield, Mass.

STEVENS TOOLS

SPEED UP

OVER 50 WONDERFUL SHORT CUTS IN NEW CATALOG T-105
ASK FOR IT
STEVENS & COMPANY
375 BROADWAY, NEW YORK

LINENDOLL EXHAUST HEATER

Attractive in appearance, with cleaning features of removable heating coil with no connecting joints inside the heater pan to leak. Meets instant approval. No odor or noise. Easily installed and operated. Will boost your winter sales—get our attractive trade proposition.

THE NORWALK AUTO PARTS CO.
Norwalk, Ohio

$5

Wood-Imes

Water Circulating Pump
For Ford Cars and Trucks

Is as reliable as the Ford Car itself and assures a positive cooling system that constantly functions. No more overheating—No more freezing in travel—Made engineeringly correct of best materials—quickly and easily installed. Write for Dealer Discounts and complete information.

WOOD-IMES MFG. CO., MINNEAPOLIS, MINN.
Formerly Mid-West Mfg. Co.

SIOUX
Trade Mark Reg. U.S. Pat. Office

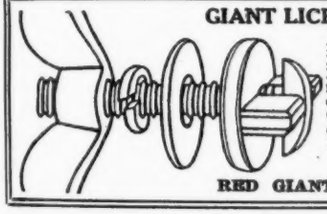
Garage Tools make *well equipped shops.* Ask your jobber.

Fast and ACCURATE for refacing, reseating and grinding all size valves.

Sioux Flexible Shaft and Attachments take the tool to the work.

Albertson & Co., Sioux City, Ia.

GIANT LICENSE PLATE HOLDERS



When you lose a license plate the cost is from $2.50 to $5.00. With Giant license plate holders you need not fear losing your license plate as they are fastened permanently to the holders and can be installed in one minute's time. Guaranteed to give perfect satisfaction or money refunded. If your jobber cannot supply you, write us direct.

List price 90c for four.

RED GIANT TOOL CORP., Lynchburg, Va.

JACOBS CHUCKS INSURE ACCURATE DRILLING

Write for circular, "A Jacobs Chuck for Every Purpose."

THE JACOBS MANUFACTURING CO.
Hartford, Conn.

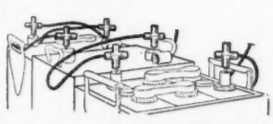
SPENCER

Should Be On Every Car You Sell

The Spencer Lock Tilting Steering Wheel first adds comfort in the driver's seat—then protects the car from theft.
And the insurance it saves pays back the purchase price.
Ask your jobber for details.
Made for Ford, Dodge, Overland, Chevrolet 490 and Superior, Maxwell, Star and Gray Cars.

The Spencer Mfg. Co.
Spencer Ohio

SHURO BATTERY CONNECTORS



A tap with a hammer anchors them into battery terminal—like a nail in a block of wood. Positive metal-to-metal contact. Built to last for years.

BURTON-ROGERS CO.
26 Brighton Ave., Boston

BATTERY SERVICE EQUIPMENT!

UNITRON Rectifier | PORTOSTAT Test Set

FOREST ELECTRIC COMPANY
New and Wilsey Streets NEWARK, N. J.

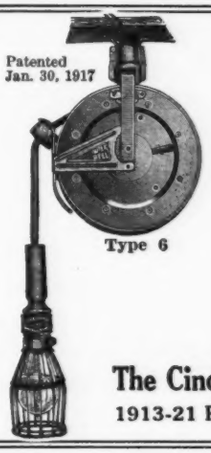
We'll Help You Make 1924 a Big Year

The Dragon franchise gives you a real quality battery, exclusive territory, generous discounts—and effective selling helps.
Get our 1924 agency proposition now.

Write or wire

ENGLERT MANUFACTURING CO.
Pittsburgh, Pa.

Dragon Storage Battery



Patented Jan. 30, 1917

Type 6

Autex Extension Reel

Takes light where wanted. Cord locked at any desired point and rewound automatically on reel when not in use. Used in all places where extension of either light or power is required, eliminating the inconvenience and danger of loose cord extensions.

Approved by Underwriters

The Cincinnati Specialty Mfg. Co., Inc.,
1913-21 Powers St., Cincinnati, Ohio

WHEN ALL advertisers demand their money's worth, all publications will provide circulation reports verified by the Audit Bureau of Circulations.

It is one of the mysteries of the advertising world that while all manufacturers demand verification of weight and quality in the material purchased, some of them still buy advertising space without knowing what they are paying for.

Such advertisers, however, are now exceptional. Most of them demand verified A. B. C. circulation statements before placing contracts.

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It is a member of the Audit Bureau of Circulations.

Racing FORDS

Write today for pamphlets and LOW PRICES covering Power-Plus Cylinder Head. Aluminite Racing Pistons and Connecting-Rods, High-Speed Camshafts. Rebuilding ALL MAKES of cars for racing a specialty. Nine years' experience.

GREEN ENGINEERING CO., Dayton, O.

Gemco BUMPERS

Bumpers for all Cars
The Price and Quality Satisfy
Complete Catalog on Request

GEMCO MANUFACTURING CO. 760 So. Pierce St, Milwaukee, Wis.

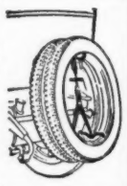
"Best Money Maker I Ever Handled" Says One of our Distributors

And his sales prove it! The reason is that the Duplex Tire Carrier & Rim Tool is one of the most popular items of equipment introduced in recent years.

DUPLEX Second Spare Tire Carrier And Rim Tool

Two tools for the price of one. Holds tires securely. Expands and contracts rims. Attached instantly. Write for details.

TRIPP-SECORD & CO.
606 Kerr Bldg. Detroit, Mich.



For information about the Durant and Star Car selling franchises write

DURANT MOTORS, Inc.
560 Jackson Avenue,
Long Island City, N. Y.

Noiseless Timing Gears

Install quietness — Cloyes NOISELESS Timing Gears. They give the motor a soft, even "purr"—permanently.

Cloyes Gear Works
1614 Collamer Ave., Cleveland, O.

Sales Representatives
United Autoware Co., Fisk Bldg., New York City
N. Lowenthal, Box 952, Ft. Worth, Texas

AXLE SHAFTS and SPRINGS

For all makes of cars. Keys, key-stock and nuts for all shafts. Differential gears for all cars.

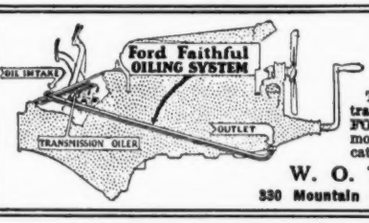
BUTLER AUTOMOTIVE SERVICE COMPANY
Easton, Pa., 101 D Street

DILL INSTANT-ONS

Dust and Valve Cap

Off or On in 5 Seconds

The Dill Manufacturing Co. Cleveland, O.



SAVES REPAIR BILLS

The recent addition of a special transmission oiling unit makes the FORD FAITHFUL Oiling System a most efficient eliminator of all lubricating troubles. Dealers Write

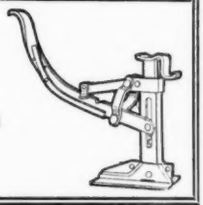
W. O. Thompson Mfg. Co.
330 Mountain View St. Pasadena, Cal.

bethlehem betterments for Motordom

Utilities—Not EXCESSories!

DISTRIBUTORS WANTED

For "HENRY" One-Lift Jack for FORD and Other Light Cars.
The Only One-Lift Jack on the Market.
The Only Jack Operated by the Foot.
Territory Available for Specialty Jobbers and Distributors. Write or Wire.



WOLVERINE SPECIALTY CO., Inc.,
Battle Creek, Mich.

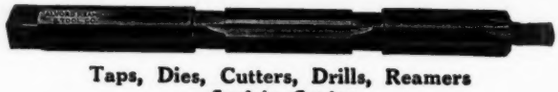
Cyclo "Dynamic" Hot-Spot for Fords

This "Modified Vapor" manifold gives a gas with lots of "kick" in it for hill-climbing — exceptionally smooth running and economical at all seasons. Vacuum control varies the heating inversely with the load.

The best permanent proposition for dealers.

CYCLO MANIFOLD CO. High & Chestnut, Akron, Ohio

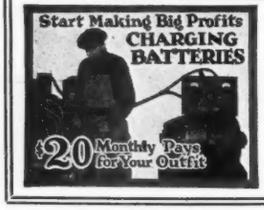
ALVORD QUALITY TOOLS



Taps, Dies, Cutters, Drills, Reamers

Send for Catalog

ALVORD REAMER & TOOL COMPANY
Millersburg, Pa.



H-B 8 HOUR CHARGING PAYS FOR ITSELF

Small cash payment puts HB 8-Hour Battery Charger in your shop. Your increased profits easily carry the small $20 monthly terms, with good surplus besides. HB 8-Hour service builds trade, beats competition. An HB saves you $35 to $115 over any other outfit on purchase price alone.

HOBART BROS. CO., Box AR324, Troy, Ohio

NO-LEAK-O PISTON RINGS

Won't Leak Because They're Sealed With Oil

No-Leak-O Piston Rings are making money for dealers everywhere. Their "oilSEALing" groove—found only in No-Leak-O—packs an oil film in between piston and cylinder walls like "packing" in a pump. Oil and gas stay where they belong. National advertising is helping the dealer sell No-Leak-O by teaching the motorist the lesson of more mileage on less oil and gas. It will pay you to stock No-Leak-O at once.

Price 35c and up.

NO-LEAK-O PISTON RING CO., Dept. T-57, Muskegon, Mich.

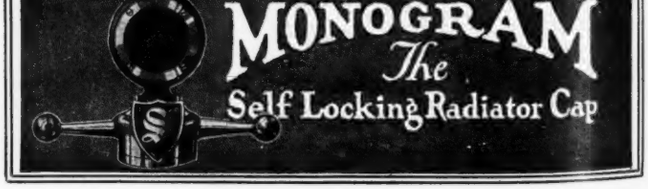
ECLIPSE Safety Driving **SHADE**

Instantly adjusted to any desired shading position with one hand from driver's seat. Makes night driving safe. One size for all cars. Write at once for our plan of distribution and full details.

SUBURBAN TRANSIT CO., Plainfield, N. J.
Subsidiary of Spicer Mfg. Co.

We Make
RADIATOR CORE EQUIPMENT
For the Complete Manufacture of
RADIATOR CORES
Ask Us About This Equipment
We make the best radiator test plug.
RADIATOR ENGINEERING CO.
626 Nesslewood Ave. Toledo, Ohio

"The Best-Equipped Shop Gets the Business"



The Utmost in Hoisting Efficiency

WRIGHT MANUFACTURING COMPANY
Lisbon, Ohio, U. S. A.

WRIGHT HIGH SPEED HOISTS

QUICK GETAWAY FOR FORDS IN THE COLDEST WEATHER

The flattened design of the Krafve Intake Mixer Manifold spreads out and completely vaporizes the gas. Gives a quick start, easier pick-up, low throttle on direct drive, more speed and mileage. Easy to instal—excellent profit. List $5.00. Write for proposition.

KRAFVE AUTOMOTIVE CORP., Oakham, Mass.

Distributors—Dealers—Agents

One of the best sellers in recent years. Eliminates all eye strain from oncoming headlights, sun glare, and road glare.

THE OPTOSHIELD

Made of sapphire blue scientifically made optical glass. Driver looks right through it. Fits any windshield. Price $3.50. Write for proposition.

DETRO SALES SERVICE CO.
1647 Penobscot Bldg., DETROIT

FRONTENAC CYLINDER HEADS
and FRONTY-FORDS

The remarkable showing of the Fronty-Ford in the 500-Mile Race at Indianapolis May 30 was due solely to the performance of the Frontenac Cylinder Head. This Head is adapted for use on your Ford car by its designer and builder, Arthur Chevrolet. Write for FREE Catalog. Book, "How to Build a Fronty-Ford," $2.00; free with orders of $50.00 or more.

CHEVROLET BROS. MFG. CO., 410 W. 10th St., INDIANAPOLIS

THE CLEARING HOUSE
OF THE AUTOMOTIVE INDUSTRY

FOR PARTS, ACCESSORIES, TIRES, MACHINERY REBUILDING, REPAIRING, WELDING AND USED CARS. ALSO HELP AND SITUATIONS WANTED AND MISCELLANEOUS CLASSIFIED ADVERTISING

USED AND NEW AUTO PARTS

Special Prices for the Next 60 Days

We need room. Write us for anything no matter how old or late Models.

Sander Bros. Auto Wrecking Co.
West Point Iowa

WRITE US FIRST!
Save Time and Money

We carry a complete line of Automobile Parts

Transmissions (all kinds)

Cylinder Blocks	Magnetos (all kinds)
Drift Shafts	Carburetors
New Gears (all kinds)	Starters
Used Gears (all kinds)	Rear Ends

400 Motors of all kinds in stock at all times

WRITE

BENNETT BROS.
Largest Auto Wreckers in the Country
Grant and Water Sts. Pittsburgh, Pa.
Mail Orders Given Prompt Attention

Over 8000
electrical units in stock

Our large stock of motors, generators, transformers, etc., insures immediate shipment. We can furnish you with new or guaranteed rebuilt equipment at prices that save you 25 to 40%. Write for our bulletin and tell us what you need.

The Fuerst-Friedman Co.
Cleveland, Ohio

DOWMETAL PISTONS

Lighter, stronger, and longer wearing than aluminum or iron. Can be fitted with bronze bushings in the wrist pin holes same as in iron pistons. Dowmetal has no permanent growth. The expansion is little more than iron.

SEND FOR PARTICULARS
LAMMERT & MANN CO.
Cylinder and Crankshaft Grinding
215-21 N. Wood St. CHICAGO Phones West 4918

Attorney-at-Law and Solicitor of Patents
C. L. PARKER
Formerly Member Examining Corps., United States Patent Office

American and foreign Patents secured. Searches made to determine patentability and validity. Patent suits conducted. Pamphlet of instruction sent upon request.

McGill Building, WASHINGTON, D. C.

We've Got Everything

In New and Used Auto Parts, Accessories and Supplies, for all makes and models of cars.

Engines; Transmissions; Clutches; Axles; Wheels; Rims; Tires; Radiators; Gears; Axle Shafts; Bearings; Magnetos; Starters; Generators; Coils; Batteries; etc., etc.

Ours is the largest stock of its kind in the world.

Warshawsky & Co.
World's Largest Replacement Parts House
1914 So. State St., Chicago, Ill.
No Branches Ph. Calumet 7315 No Branches

ANY PART for ANY CAR NEW or USED

Send for Catalogue
Cincinnati Auto Parts & Wrecking Co.
712-714 Walnut St.
CINCINNATI, OHIO
Parts our middle name

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PROMPTNESS ASSURED BEST RESULTS

Send drawing or model for examination and report as to patentability

WATSON E. COLEMAN, Patent Lawyer
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AUTO Save 50 — 90% 2000 Models **PARTS**

NEW AND USED GEARS, AXLES, BEARINGS, SPRINGS, MAGNETOS, GENERATORS, ETC. JOBBERS IN BANKRUPT AUTO SUPPLIES.

BRIGHTMAN AUTO EXCHANGE
321 Windsor Ave. HARTFORD, CONN.

AUTOMOTIVE PATENTS

Engineer-Attorney Specializing in Power and Automotive Inventions

M. P. LAUGHLIN
48 East 41st St. New York

WICHITA AUTO WRECKING CO.
"The Old Reliable"

Offers you quick service, quality parts and absolute satisfaction,—and our prices are a little lower. We are an old reliable house and all that implies. Our stock of parts is one of the largest in the country—from a 1907 one cyl. Reo to a 1921 Overland Four.

Wichita GIVE US YOUR NEXT ORDER Kansas

STUDEBAKER PARTS AT HALF-PRICE

For 1914-15-16-17 and 18 cars. Front and rear axles, motor and transmission cases, generators, starters, gears, etc.

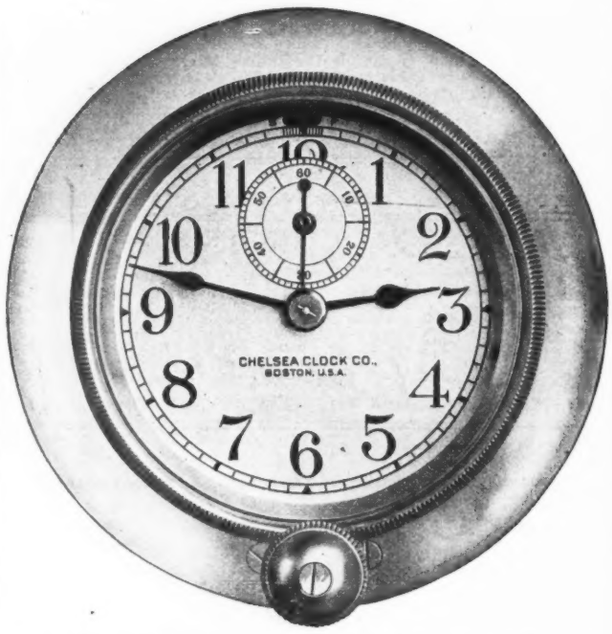
Order by catalogue number

AUSTIN MOTOR COMPANY
48 N. Laramie Ave., Chicago, Ill.

AUTO INDUSTRY MAILING LISTS

Send to headquarters for dependable lists of Automobile Owners, Dealers, Accessories, Garages, Tire and Battery Stations, Truck Fleet Owners, Bus Lines, Taxicab Companies. Write for catalog and prices.

MOTOR LIST COMPANY
403 Grand Ave. 433 Howard St.
Des Moines, Iowa Detroit, Mich.



The 8 Day—High Grade, Flush Inset Model J, with outside winding and setting device. (Also other models and finishes).

CHELSEA AUTO CLOCK

Over 150,000 in use by satisfied owners
ALL OTHERS are COMPARATIVE

Scientifically Built to
WITHSTAND the JOLTS and JARS
of Automobiles, Trucks, Motor Boats, etc.

— AND —

KEEP EXCELLENT TIME

— AND —

Last Practically Indefinitely
Cost More Than Others

—BUT—

THE VALUE IS THERE
ASK any USER

TO DEALERS We give you a liberal discount insuring good profit on each sale. You can confidently recommend the World Renowned CHELSEA Clocks to the most exacting customer—Many clocks wanted for replacement and equipment.

CATALOG on Request

CHELSEA CLOCK CO. Established 1897
10 State St., Boston, Mass.

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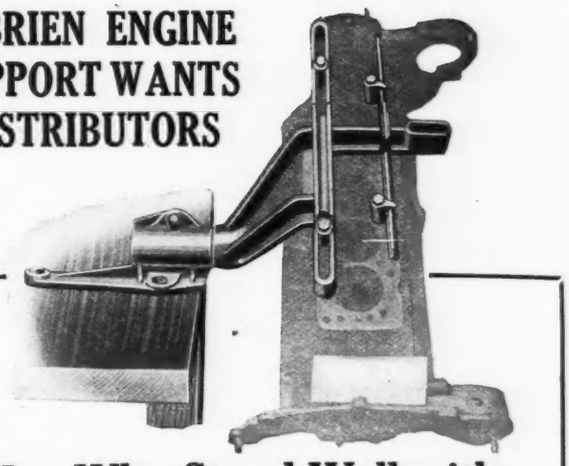
O'BRIEN ENGINE SUPPORT WANTS DISTRIBUTORS



Men Who Stand Well with Repairmen and Fleetowners

and who put real selling into their work. If you want to add several thousands a year to your income, write or wire now for our new, more profitable agreement. We have increased the distributors' share while raising no sales obstacles.

This support holds *all* demountable head auto and tractor engines and saves time on making repairs.

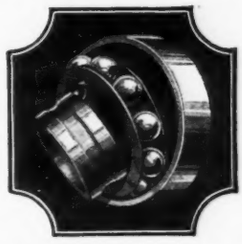
Learn the score of excellent individual selling points from the illustrated literature waiting for you. Send for it now.

Some territory still open.

Banner Accessory Mfg. Co.

2629 La Salle St.
St. Louis, Mo.

"NORMA" PRECISION BALL BEARINGS

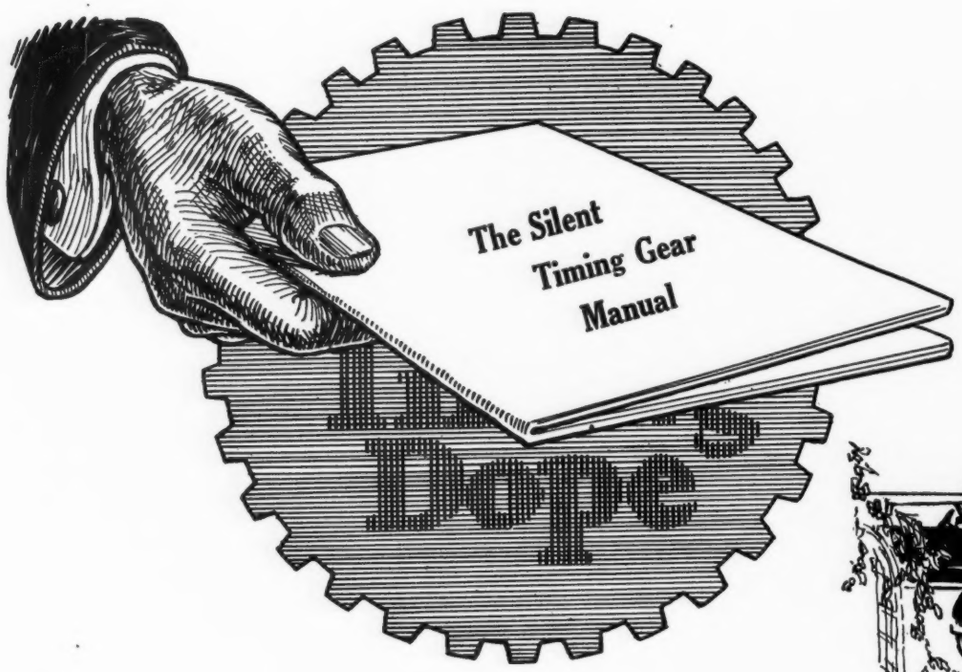


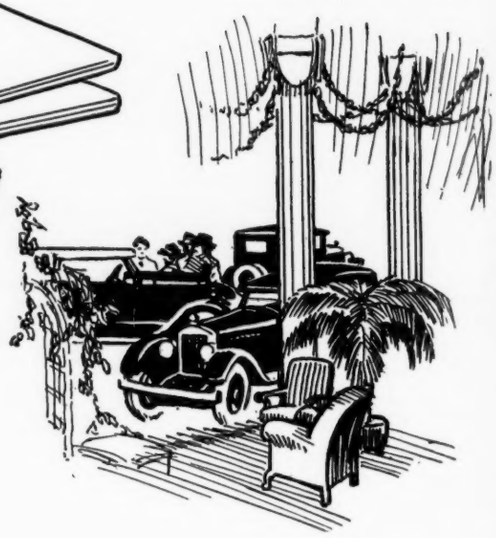
Internationally recognized as the standard bearings for ignition apparatus and lighting generators

THE NORMA COMPANY OF AMERICA

Anable Avenue
Long Island City New York

BALL, ROLLER AND THRUST BEARINGS





Here Is the Data You've Wanted!

All there is to know about timing gears; data on all cars, sizes, prices, instructions for installing, kinks and shortcuts that make money for you. It will be handed to you free, at the Chicago show!

No book with so much useful information, so many ways of getting more money out of timing gear sales, has ever been written. You'll be the loser if you leave the Coliseum without one, or if you fail to take away with you one of our Miniature D. & B. Gears, for examination.

There will be exhibits of D. & B. Gears with hundreds of thousands of miles in their history, running as silently as when new.

The basic principles of correct engineering practice in silent gear manufacture and application are not constantly changing factors.

Have you noticed that the fundamental principals and applications of our product have not varied since proved correct some years ago?

Then Why Experiment?

At the Show

CHICAGO

Spaces 94-95, Coliseum Balcony, opposite main entrance. Also D. S. F. Co. Space 44, Coliseum Balcony, Jan. 26 to Feb. 2.

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